

The Second and Third Disasters

Education in Post-Disaster Recovery in Rural Nepal

by

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I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

ABSTRACT

Education is widely recognized as a fundamental part of recovery process after a natural disaster. Psychologically, it provides a sense of normality by reintroducing a daily routine, helps children cope with the trauma of recovery and provides hope for a better future. Schools are also used as a means for communicating vital survival information. More importantly, education restores safety mechanisms for children which often collapse in the wake of a disaster, making children extremely vulnerable to exploitation. Experience shows that children who are out of school for prolonged periods of time are increasingly less likely to resume their studies, which becomes a tremendous obstacle for battling poverty. Despite this, a mere 2.7% of the total available humanitarian aid is allocated to education.¹

This thesis specifically looks at Nepal in its recovery state after the 2015 earthquake, which devastated numerous regions across the nation, killed over 8,700 people and destroyed or damaged 8,300 schools, leaving almost one million children without a place to study. Nearly three years after the disaster, as basic infrastructure is being rebuilt, many children remain out of school. Parents fear for their children's safety in poorly constructed school buildings, are unable to afford the financial burdens of "free" public education or simply do not see the value in it, as the quality of public education in Nepal is incredibly low.

Recognizing education as a backbone to recovery and sustainable development, this thesis explores the agency of architecture in providing incentives for parents to send their children to school throughout every phase of disaster recovery, ensuring that student attendance remains a constant. By analyzing a complex range of obstacles that are keeping children out of classrooms, the proposal becomes a dynamic link between four existing school facilities on the selected site. The design does not try to act as a school itself, rather it facilitates attendance at the schools already in place. Introduction of informal learning spaces promotes child and adult education, while a number of flexible public programs aim to integrate alternative education facilities into the daily life of the community. Together, they are designed to adapt to community's needs as it moves through different phases of recovery.

This work is rooted in two separate two-month-long visits to Nepal. Part of each trip was spent working with an international NGO (All Hands Volunteers) on six school construction projects in remote villages in Nuwakot and Sindhupalchok districts, providing opportunity for numerous conversations with local staff. This thesis is founded on these first-hand experiences and invaluable discussions.

1. UNESCO, "Aid to Education is Stagnating and Not Going to Countries Most in Need," *Global Education Monitoring Report*, 31/REV2 (May 2017), <http://unesdoc.unesco.org/images/0024/002495/249568e.pdf>.

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“Every social movement begins with - and is sustained by - the passionate voices of those who see wrongs and want to right them.”

-Kevin M. Cabill

This work is dedicated to those voices.

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LIST OF ABBREVIATIONS

AHV	All Hands Volunteers
CGI	Corrugated Galvanized Iron
GDP	Gross Domestic Product
GNI	Gross National Income
HAI	Human Assets Index
ICRC	International Committee of Red Cross
IDP	Internally Displaced Person
LDC	Least Developed Country
NDHS	Nepal Demographic and Health Survey
NGO	Non-Governmental Organization
NHRC	National Human Rights Commission
NRA	National Reconstruction Authority
OCHA	The United Nations Office for the Coordination of Humanitarian Affairs
ODA	Official Development Assistance
OECD	The Organization for Economic Co-operation and Development
OHA	Official Humanitarian Assistance
TLC	Temporary Learning Centre
UN	United Nations
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UNICEF	The United Nations International Children's Emergency Fund
WASH	Water Sanitation Hygiene





preface

fig. 0.01 (previous page)
Looking at the valley below
from one of the school
construction sites

fig. 0.02 (opposite page, top)
Getting the formwork ready
before the concrete pour of
the ground floor

fig. 0.03 (opposite page,
bottom) One of the schools
under construction, ready to
install metal roof trusses on
the second building

My interest in the humanitarian field and the idea of ‘emergency architecture’ began in 2016, when I took up a volunteering opportunity with the international NGO All Hands Volunteers (AHV). In the fall of 2017 AHV merged with Happy Hearts Fund to create All Hands and Hearts – Smart Response, which focuses on emergency response and long-term rebuilding in disaster affected regions around the world. AHV has been operating since 2004 and has completed dozens of projects in countries like Thailand, Japan, United States, Peru and Fiji.

The program that particularly interested me focused on the post-disaster reconstruction of rural areas in Nepal, devastated in the 2015 earthquake. In the summer of 2016, I worked on three school construction sites – my first experience with disaster recovery. I went into the program knowing absolutely nothing about Nepal or the work I would be doing; naturally the first trip was quite an eye-opening one.

The experience put me face to face with the reality of construction in a developing country. Everything on site had to be done by hand. Every delivery truck had to be unloaded by volunteers, whether it was bricks, sand, rebar, 50kg bags of cement or sheets of CGI (corrugated metal). Formwork had to be constructed, installed and secured for every concrete pour. Concrete had to be mixed by hand, mixing cement, sand, gravel and water with a shovel to the right consistency. Delivered rebar came in bundles, approximately 10m long and bent in half in order to fit onto the back of a truck. Volunteers had to manually straighten it out, cut it and bend it according to which structural member it was going to (such as a column or a beam). Working in extreme conditions, where we faced a shortage of skilled labour, tools and resources, and were limited by intense monsoon rains and incredibly complex topography, revealed the true value of knowledge, skillsets, and problem solving on a construction site.

In the summer of 2017, halfway through my thesis research, I returned to work with AHV again on three new school construction projects and complete additional research. This trip was a lot more focused- I knew what to look for, what questions I needed answered, and the people I wanted to talk to. I interviewed numerous local staff members who had seen the reconstruction of



fig. 0.04 Sheets of corrugated metal installed over metal roof trusses



fig. 0.05 Excavating the foundations for the second school building on the site





fig. 0.06 Construction of the gabion walls



fig. 0.07 Tying rebar for the roof concrete band

fig. 0.08 (opposite page, top)
Completed concrete pour of
the plinth band

fig. 0.09 (opposite page,
bottom) Tying rebar and
installing formwork for the
plinth band

fig. 0.10 (page 7-8) Installing
formwork for the concrete
pour of the ground floor

their country unfold, and provided invaluable insight into the recovery process. I asked a lot more questions on the construction site, wanting to understand why certain decisions have been made and what were the limiting factors in the process.

Reflecting on my time in Nepal, I think each experience had an important role in the development of this thesis. First trip was done with completely fresh eyes; being thrown into the reality of a disaster response program was an incredible learning experience. After I returned home, I jumped into a period of intense research, trying to understand what I saw and trying to make sense of it. I went through endless scholarly journals, newspaper articles, books, maps, statistics and online resources in search for a question I wanted to answer through my work. Having a rough idea of the direction I wanted to pursue, I returned to Nepal to answer questions I couldn't answer through reading, to understand the nuances of culture and social practices that cannot be described on paper. Ironically, while the second trip did answer a lot of questions, it made me acutely aware of the fact that the more research I do on this topic, the more I realize how little I know.

Presenting this work as an outsider, not only to Nepal but also to the field of humanitarian response, I am by no means proposing a defined solution. The issue of resilience building in a developing, disaster-hit country is immensely complex, where no single template of response can ever be applied. I am aware that everything in this book may be wrong. However, this proposal should not be read as a definitive object, but rather as an alternative way of approaching the problem from the point of view of an architect and act as an addition to the larger ongoing discussion.







PART I

INTRODUCTION TO FOREIGN AID

overview of the division between humanitarian and development aid, introduction to community resilience & role of education in disaster recovery

CHAPTER 1.1

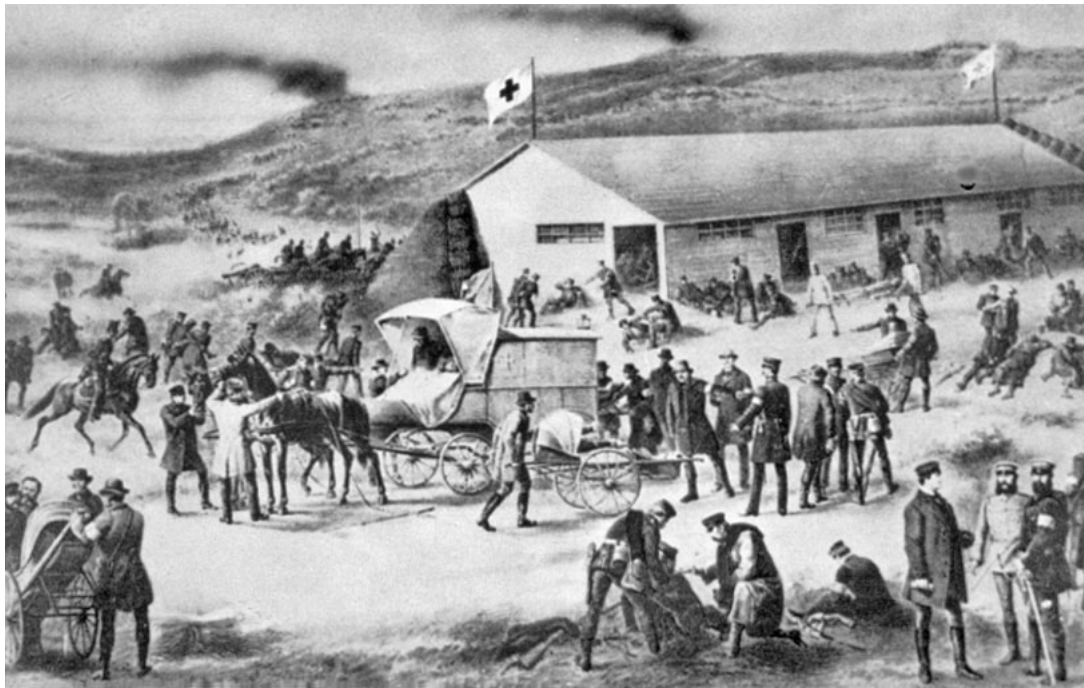
THE ISSUE WITH AID

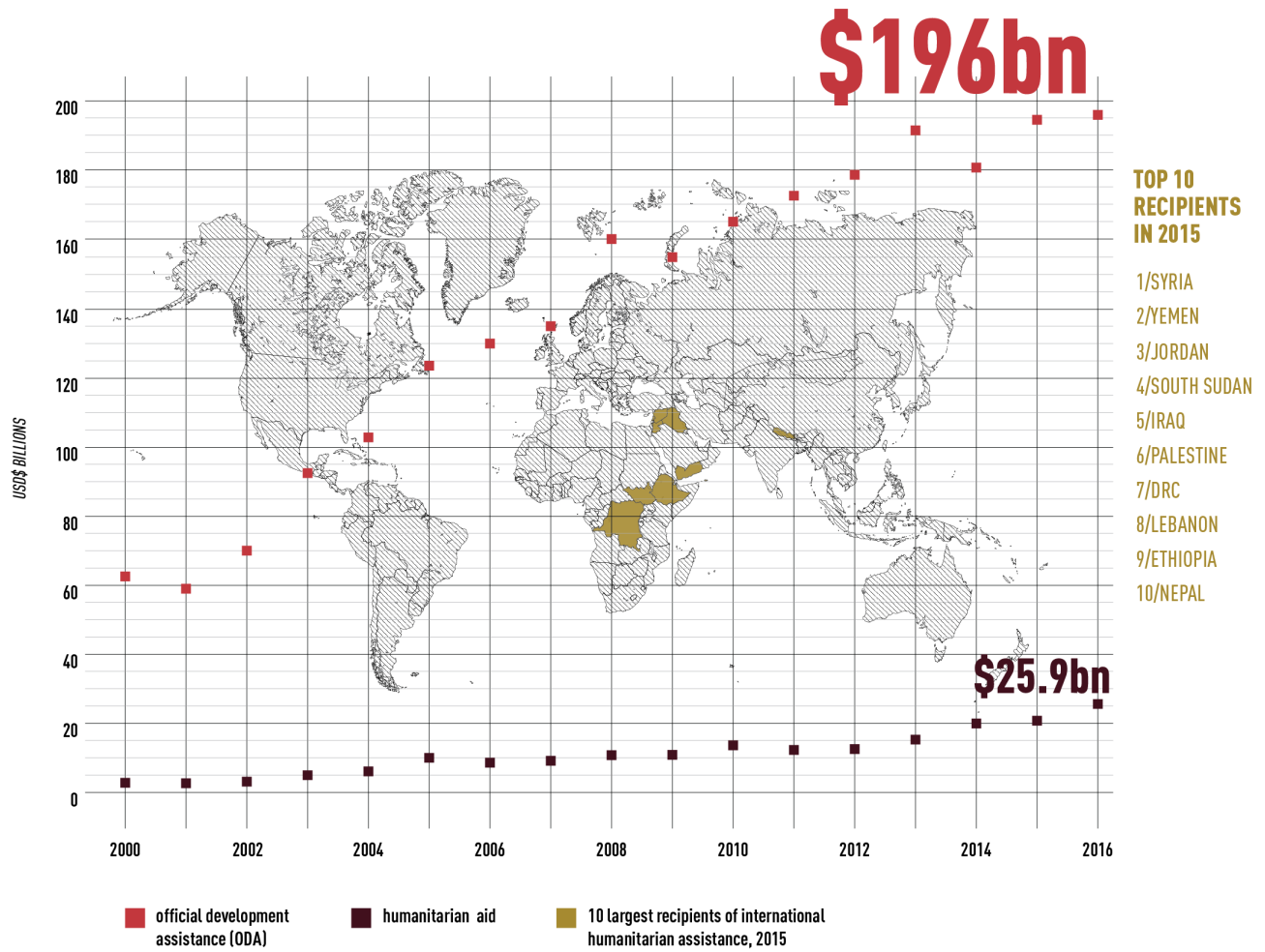
fig. 1.01 (opposite page, top) Bataille de Solferino
24 juin 1859 (Battle of
Solferino June 24 1859)
artist: Adam, A.

fig. 1.02 (opposite page,
bottom) Red Cross field
hospital in Duppel during
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Holstein war
artist: unknown

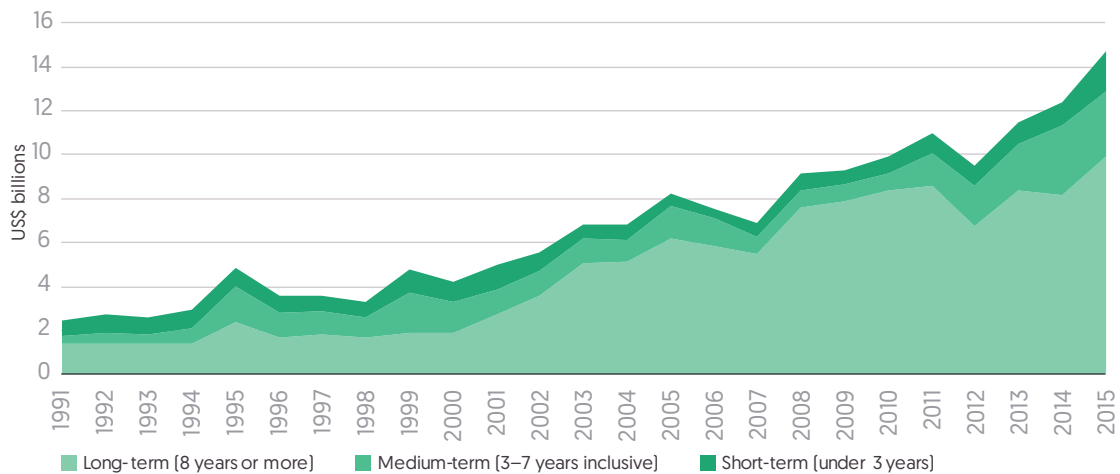
The efficacy of humanitarian aid has been an increasingly contested subject. The West is being continuously bombarded with horrifying images of starving children, humanitarian emergencies, child labour and horrific living conditions of millions of people in developing countries. Having the ability to donate money to a charity seems like the easiest way to take off the mental burden of knowing that the latte you just purchased could have bought lifesaving medication for a child in South Sudan. In part, this is why humanitarian aid has seen an immense increase in funding over the course of the past three decades:¹ it is by far the easiest way to show compassion without putting in the effort to resolve the underlying obstacles to development many countries are facing.² While total international humanitarian assistance has reached a staggering US\$27.3 billion in funding in 2016, its success has been rather disputed.³

Foreign aid can be subdivided into two broad categories: humanitarian aid and development aid. Traditionally, the foundation of humanitarian aid can be attributed to the Geneva International Conference of 1863, which established the International Committee of Red Cross (ICRC) and gave rise to the development of the humanitarian laws of war. More specifically, the movement can be traced back to 1859, when Swiss businessman Henry Dunant witnessed the Battle of Solferino in northern Italy, fought between French and Austro-Hungarian troops.⁴ Deeply horrified by the brutalities of war and by the number of soldiers left to die on the battlefield, simply because medical personnel was unable to get to them, Dunant joined local residents in helping the wounded on both sides.⁵ He later wrote a memoir of his experience, *A Memory of Solferino* (1862), to bring attention to what he had witnessed, and more importantly to suggest two strategies to help reduce the casualties on the battle fields. He proposed the creation of relief societies, which would be responsible for the care of the wounded in times of war, as well as production of a legal framework for protection of all medical personnel and the wounded. The publication became a European bestseller, and within three years the ICRC and the Geneva Conventions were created.⁶ It was during the Conference of 1863 that red cross on white background was adopted as the symbol for medical staff.





FOREIGN AID 2000-2016: OFFICIAL DEVELOPMENT ASSISTANCE (ODA) AND HUMANITARIAN AID; FROM ALL DONORS



LONG-, MEDIUM-, AND SHORT-TERM RECIPIENTS OF OFFICIAL HUMANITARIAN ASSISTANCE, 1991-2015

From its foundation in late 19th century and to this day, humanitarian aid (also referred to as emergency aid) maintains one primary focus: saving lives.⁷ As defined by the Principles and Practices of Good Humanitarian Donorship, the fundamental goal of humanitarian action is “to save lives, alleviate suffering and maintain human dignity during and in the aftermath of crises.”⁸ Humanitarian aid operates on the principles of humanity, neutrality and impartiality, and thus fundamentally claims to be apolitical.⁹ Given the urgent and fast-paced nature of the response, money allocated to humanitarian aid typically has a 6–18 month spending window.¹⁰ Humanitarian response does not attempt to resolve conflicts, promote democracy or strengthen collapsing economies; its function is to save lives, and as such only treat the symptoms of a crisis.¹¹

Humanitarian crises are often prolonged and recurrent emergencies, leading to foreign aid being allocated for extended periods of time.¹² However, typically it happens in successive annual grants, even for long- and medium-term recipient countries. In 2015, long- and medium-term recipients received nearly 88% of total official humanitarian assistance. It is recognized that multi-year planning has the potential to support prolonged crises and reduce the gap between humanitarian, development and stabilization programs as it exists today.¹³ However, most of the UN-coordinated humanitarian response plans are allocated for one year only, despite many countries launching humanitarian assistance appeals year after year.¹⁴

Development aid can be traced back to late eighteenth and early nineteenth centuries, decades before Dunant gave rise to the humanitarian field with his memoir.¹⁵ In the beginning, it was led by “various intellectuals, politicians, jurists, and clergy” who “pushed for public interventions to alleviate suffering and restore society’s moral basis, concentrating on domestic issues such as temperance, charity for the poor, child labour, public education, and, most famously, the abolition of slavery.”¹⁶ As Michael Barnett, the author of *Empire of Humanity*, notes in an interview with *The Guardian*, development aid as we know it today is a byproduct of colonialism, emerging before WWII and shaping into the current model of aid after the war.¹⁷ It focuses on long-term assistance in fields such as public education, healthcare, agriculture, vocational training, and disaster risk reduction, addressing the issues of secure livelihoods, poverty reduction and economic growth.¹⁸ As such, development aid aims to address the underlying causes of crises, not just the symptoms. Given that development work takes longer to implement and aims to provide long term solutions, the funding is typically allocated in 3-5 year cycles.¹⁹ This also results in development agencies

fig. 1.03 (opposite page, top) Official Development Assistance (ODA) and Humanitarian Aid, 2000 - 2016.

Note: ODA is defined as funding “provided by official agencies”, where each transaction is “administered with the promotion of economic development and welfare of developing countries as its main objective, is concessional in character and conveys a grant element of at least 25%.”²⁰ ODA is subdivided into numerous sectors, such as social infrastructure, economic infrastructure, production sectors, debt relief, humanitarian aid and program assistance. Humanitarian assistance constitutes a small portion of ODA (roughly 11% of total ODA over the past decade).²¹

fig. 1.04 (opposite page, bottom) In 2015, majority of humanitarian funding (67%) went to long-term recipients, and 20% went to medium-term recipients, exposing the gap between short-term emergency response and long-term planning.²²

source: Global Humanitarian Assistance Report 2017

often having to cooperate and partner with recipient governments, making them more politically involved than their humanitarian counterpart.²³

The two branches of foreign aid have fundamentally different approaches to assistance and connections to politics. Both make claims to neutrality and try to distance themselves from governments and policymakers, but as Michael Barnett writes in *Empire of Humanity*, they are deeply connected to politics nonetheless.²⁴ Perhaps this can help explain why foreign aid has attracted so much criticism and became a topic of contention over the past decade. Humanitarian aid has become a political tool for nations to gain approval “in the face of mounting domestic public pressure in donor states,”²⁵ gain support of military allies,²⁶ conceal military action under the banner of humanitarian aid,²⁷ build an international image,²⁸ leverage political support from countries that rely on systematic aid²⁹ and opt for the easiest solution possible when it comes to emergency support.³⁰

As well as being deeply embedded within the political sphere, there is a number of additional issues associated with foreign aid. To start off, it is criticized for being primarily foreign-driven, and thus expensive and inefficient, often leaving affected communities out of the decision making process.³¹ Humanitarian aid sector also faces criticism for lack of accountability for their actions and concentration of power in the hands of a few largest organizations, not utilizing the diversity of agencies in the field.³² In addition, as Gilles Carbonnier argues in *Humanitarian Economics*, humanitarian assistance can disincentivize investment in development and disaster prevention, perpetuating recipient countries’ reliance on aid.³³ As an example, he writes that governments of disaster-prone nations can find it hard to justify a tax increase or forced resettlements for the purpose of disaster prevention, which can lead to public condemnation. It is easier to fall back on international aid, which serves as a safety net for covering the reconstruction expenses. Finally, the issue with aid often comes down to its distribution. It is now widely accepted that natural disasters are primarily social constructs resulting from political and economic failures.³⁴ Just as the Indian economist Amartya Sen famously argues in *Poverty and Famines* that famines are a result of political and economic factors, as opposed to the declining food production, devastation of natural disasters is vastly influenced by the government’s response and its efficiency of resource distribution, not resource scarcity.³⁵

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US foreign policy


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Thu 21 Dec 2017 09:26 GMT

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fig. 1.05 Article from *The Guardian*, December 21 2017; example of foreign aid being used as a political tool

News > World > Asia

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International aid continues to pour into Nepal to help victims of the earthquake but import restrictions are delaying its onward journey AFP

fig. 1.06 Article from *The Independent*, May 3 2015; example of limitations of foreign aid due to political and economic failures, rather than resource scarcity

CHAPTER 1.2

COMMUNITY RESILIENCE AS DISASTER PREPAREDNESS

Foreign assistance is critical for many disaster-prone countries, as well as for nations recovering from a natural disaster. However, the effectiveness of aid is being challenged by the numerous factors described in the previous section. Humanitarian aid can be seen as part of a top-down approach to emergency management, an approach characterized by “decisions made at the central-state level, and regulations ... imposed in an exercise of top-down authority.”¹ One of the biggest criticisms of this methodology is the fact that it primarily focuses on senior officials who are not involved in implementing the policies they adopt, as lower-level officials and private actors are.² The decision-making process becomes very technical, calculated and contextless, which doesn’t incorporate input from local communities and officials, leading to a “functional division of policy making and implementation.”³ Alternatively, a bottom-up approach to disaster management sees policy making as “an agent of building social and state capacity,”⁴ built on communication between public and private actors, as well as the affected populations who are meant to benefit from the policies.⁵ Decentralization of responsibilities and decision-making during an emergency and post-disaster, as well as building up local capacities, empowers affected communities to take charge of the response and provide an opportunity for them to become key actors in the preparedness and reconstruction efforts. Dilanthi Amaratunga and Kanchana Ginige describe the benefits of decentralization of decision-making in *Post-Disaster Reconstruction of the Built Environment*, referencing the work of S. El-Masri and G. Tipple.⁶ While specifically addressing decision-making in post-disaster reconstruction, their approach can be applied to numerous fields of post-disaster recovery. As described by the authors, decentralization of responsibilities will “enhance local initiatives, maximize the use of resources, respond to the real needs of the people, and build appropriate systems for defining responsibilities and accountability in the administrative system.”⁷

The bottom-up approach to disaster management strengthens community resilience in order to allow the affected populations to respond to the emergency in a self-reliant manner. The concept of resilience is used in numerous fields, ranging from engineering to ecology to psychology. In engineering, resilience is used to describe elasticity of a material, or how much energy it is able to

$$\mathbf{RISK} = f(\textit{hazard} \times \textit{exposure})$$

$$\mathbf{DISASTER} = f\left(\frac{\textit{hazard} \times \textit{vulnerability}}{\textit{resilience}}\right)$$

fig. 1.07 The level of **risk** a community is exposed to not only depends on the frequency and intensity of a natural hazard, but on community's vulnerability (or exposure) to the risk. For example, when a storm hits Hispaniola Island, Haiti typically experiences much more severe mudslides and greater damages, as opposed to Dominican Republic on the other side of the border. Deforestation is a major environmental problem in Haiti, which has led to severe soil erosion, loss of top soil, intensifying droughts and loss of protective cover against the storms. Dominican Republic, on the other hand, is covered in dense forests.⁸

The degree to which a natural hazard transforms into a **disaster** is based on the response capacity of a community (or the measure of how resilient a community is).⁹ If both Nepal and Japan are hit by the same 7.0 magnitude earthquake, the scope of the disaster is going to be very different due to each government's capacity to respond to it.

absorb before it undergoes permanent deformation. In ecology, resilience refers to a system's adaptive capacity- ability to return to pre-disturbance levels or transform to a different state adapting to new conditions. In the context of disaster recovery, resilience refers to the ability of affected populations to “bounce back” or recover after the devastation of a natural disaster as quickly as possible. However, as Manyena, O'Brien, O'Keefe and Rose argue in "Disaster Resilience: a bounce back or bounce forward ability?", the definition of resilience should be understood as the ability to “bounce forward” instead of “bouncing back” in order to decrease or remove vulnerabilities which placed affected populations in a state of emergency in the first place.¹⁰ In some countries it may be poor selection of settlement sites, such as close proximity to water in flood-prone areas; in others it could be poor construction practices in highly seismic zones. These issues need to be tackled before reconstruction begins and reproduces the same vulnerabilities. In that sense, definition of resiliency begins to incorporate the idea of growth and acceptance of change, seeing a disaster as a catalyst for development.¹¹

Community resilience can be defined as “the ability of a community to not only deal with adversity but in doing so reach a higher level of functioning;” it is rooted in the idea of “human agency” and how much a community engages in self-initiated action.¹² Capacity-building programs aimed at strengthening community resilience recognize that it consists of a multitude of elements: knowledge of hazards, shared community values, established social infrastructure, positive social and economic trends, partnerships, as well as available resources.¹³ Resources are not just financial resources, but more importantly skills and knowledge present in the community.¹⁴ As David King writes in *Disaster Resilience*, strengthening community resilience is fundamentally grounded in “activities like education, prevention, communication and unity of purpose, or shared beliefs and values. It is a characteristic that grows out of people and their communities.”¹⁵ Thus, resilience is something that can be cultivated and encouraged, but not necessarily planned or legislated.¹⁶ Therefore, from the point of view a designer or a planner, it is crucial to understand the dynamics of a community before implementing any capacity-building programs.¹⁷

This bottom-up approach to aid focuses on developing local capacities and strengthening community resilience, targeting some of the fundamental issues in disaster management. As it is treating more than just the symptoms of the problem, the aim is to reduce community vulnerability and remove its reliance on foreign aid.

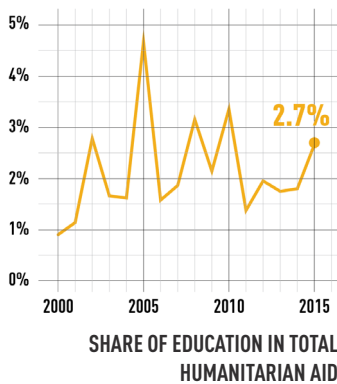
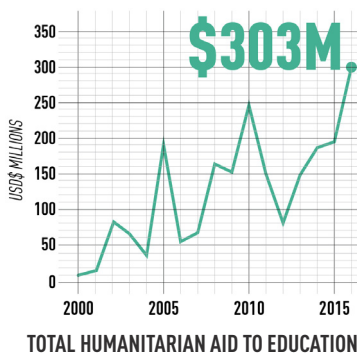


fig. 1.08 Strong social infrastructure, shared sense of purpose and belonging to a community play a big role in cultivating resilience. In the photo above, residents of numerous nearby villages gather for a day of dancing, sports events and a communal dinner. Nepal, 2016.

CHAPTER 1.3 ROLE OF EDUCATION IN DISASTER RECOVERY

fig. 1.09 (top) Total humanitarian aid to education reached a historic high in 2016 at US\$303 million

fig. 1.10 (bottom) Despite reaching an all-time high, education still received only 2.7% of total humanitarian aid in 2016



Within the framework of resilience-building, education plays a vital role in strengthening communities. Schools not only provide formal education for the children, but act as sources of informal knowledge for adults as well. This is critical when local authorities are distributing information about disaster preparedness and emergency response, proper hygiene and disease prevention, and so on. Schools become the means of building up skills and knowledge, which are fundamental aspects of developing resilience. They act as a grounding force within a community, providing a shared sense of purpose and hope for a better future.

Access to education becomes especially critical at a time of post-disaster recovery. As Kevin Cahill writes in *Even in Chaos, Education in Times of Emergency*, education is “not only an expression of a basic human right, but represents the only proven path to growth, development and peace.”¹ In the aftermath of a disaster, schools are often the only safe spaces for children to inhabit. Psychologically, they provide students and entire communities with a sense of normality by reintroducing a daily routine into their lives and help them cope with the trauma. Schools are also outlets for delivering essential survival and safety information.² As human trafficking surges in the aftermath of a disaster, children are easy targets for traffickers, as they are the most vulnerable to exploitation. Schools become the basic safety mechanisms that provide crucial protection for children amid conditions of chaos and desperation.³

UNICEF notes that in their experience, children that stay out of schools for prolonged periods of time are increasingly less likely to resume their studies, which becomes a tremendous obstacle for battling poverty.⁴ Here, education is fundamental for allowing kids to build their future. As Kevin Watkins, executive director of the Overseas Development Institute in London notes, investment in education can provide children with knowledge and skills to enter the workforce as literate and skilled young adults and have the opportunity to find secure livelihoods.⁵ It provides them with an opportunity to rise out of poverty and support their families. On the flip side, if children are denied access to education, they are facing “not just a few years of poverty but ... a lifetime of poverty and deprivation.”⁶

Evidence from numerous humanitarian crises around the world, taken in different cultural, religious and political contexts, demonstrates that families and communities put access to quality education as one of the highest priorities as early on in an emergency as possible.⁷ However, education has remained one of the lowest priorities in humanitarian funding, as it is not considered a survival necessity, like medical and food aid. In 2016, despite hitting a historic high at US\$303 million, funding allocated to the education sector constituted a mere 2.7% of the total available humanitarian aid.⁸



fig. 1.11 Schools are used to deliver essential safety information. In the photo, children are practicing an earthquake drill in Matatirtha, Nepal.
photo: Jim Holmes for AusAID

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INTRODUCTION TO NEPAL

overview of geography, economy and socio-demographic conditions, as well as the earthquake that devastated the country in 2015 and role of education in the recovery process





CHAPTER 2.1

INTRODUCTION TO NEPAL

fig. 2.01 (previous page)
Annapurna Base Camp,
elevation 4,100m



fig. 2.02 Nepal is bounded by India to the south and China to the north

* **LDC classification** is based on socioeconomic development of the country. The three criteria for evaluation are: *income* (GNI per capita is below \$1,035), *human assets index* (HAI) based on nutrition, health, education and adult literacy rate, and *economic vulnerability index* (EVI).

Nepal (officially the Federal Democratic Republic of Nepal) is a small landlocked nation in South Asia, bounded by India on the south and China on the north side, lying primarily within the Himalayan range. Roughly measuring just 800km by 200km, it has a population of 29.3 million people (as of 2017).

With quarter of the population living below the international poverty line, Nepal has been on United Nation's list of Least Developed Countries (LDC*) since 1971. There are several factors that contribute to lack of the nation's development, including its geographical location, unstable political environment and widespread corruption. The following section explores these factors in greater detail.

GEOGRAPHY

As mentioned earlier, majority of the country falls within the Himalayan range. The mountain range itself is a result of the collision between the Indian Plate and the Eurasian Plate that started roughly 50 million years ago.¹ This collision is still happening today, with Indian continental plate slowly descending underneath Tibet at a rate of about 1.8m every 100 years.² As a result, Himalayas are rising at a rate of about 1cm per year, which is being reversed by erosion and weathering at roughly the same rate. As the Indian plate is still in motion, pressure is continuously building up deep below the ground. When pressure finally overcomes friction, plates momentarily slip, producing an earthquake; this makes Himalayas a highly seismic region.

With roughly 83% of the nation covered by mountains, extreme variation in topography (ranging from 65m to 8,848m above sea level) produce incredible geographic diversity.³ Nepal is roughly split into three geographic regions – Terai (plains below 300m), lesser Himalayas (elevation between 300m – 1,500m) and higher Himalayas (mountainous region above 1,500m), each having distinct climatic conditions. As elevation and precipitation levels fluctuate dramatically across the country, so do the climate zones, ranging from tropical to alpine

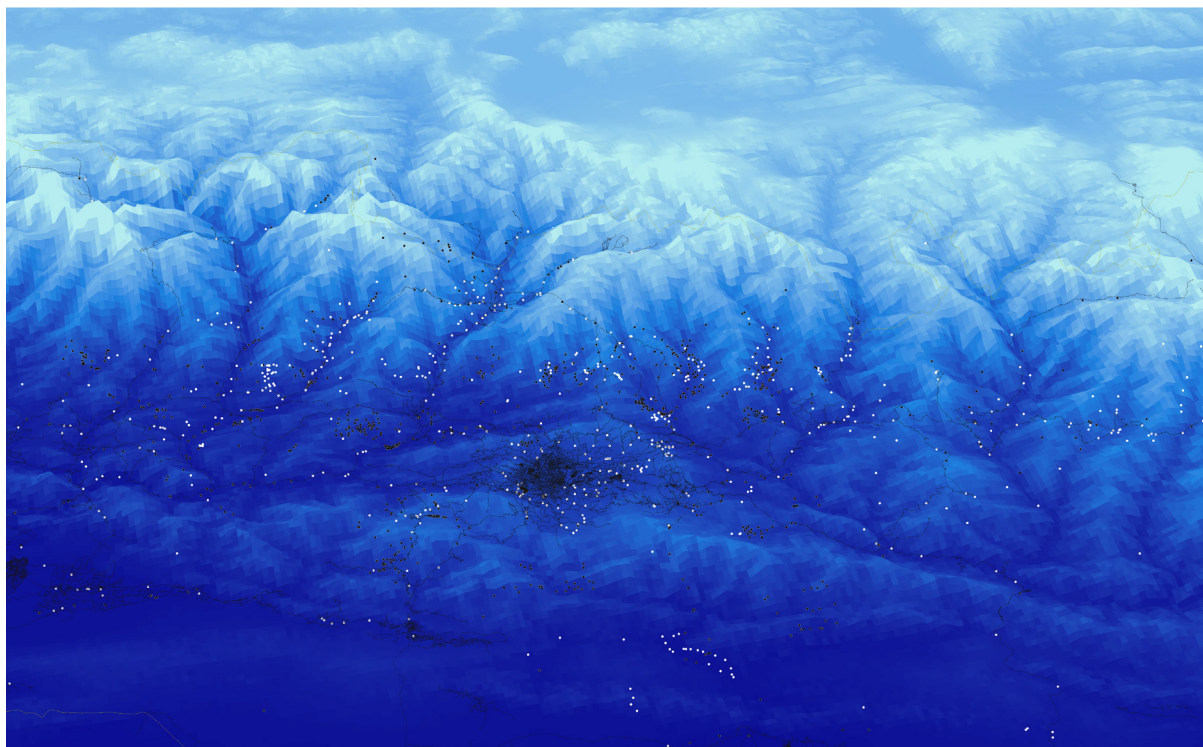
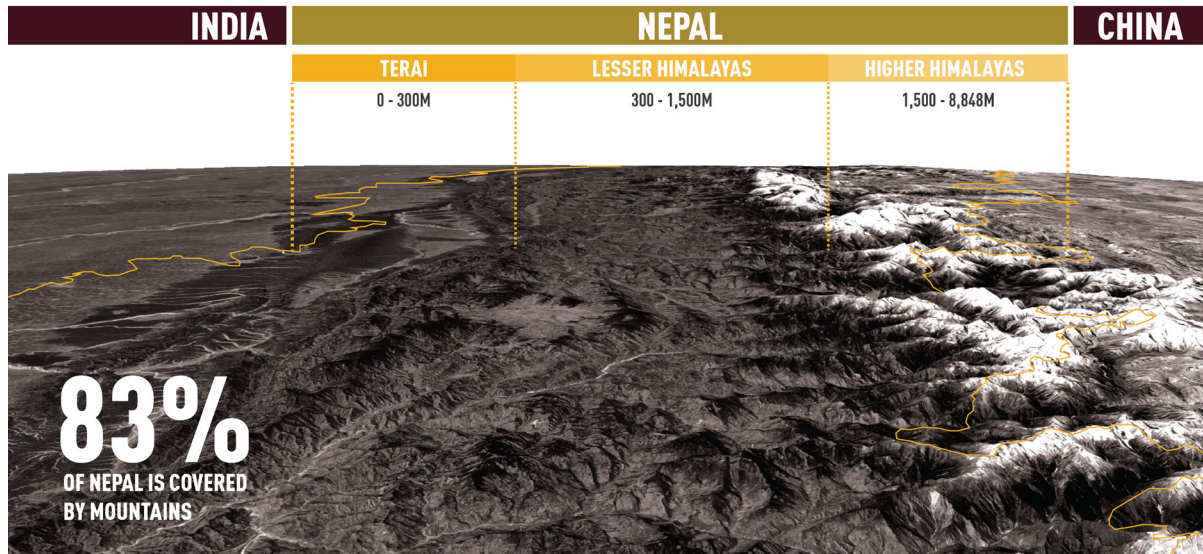


fig. 2.03 (top) Nepal is split into three geographic regions: Terai, lesser Himalayas and higher Himalayas.

fig. 2.04 (bottom) GIS model of Nepal's complex topography depicts density of settlements across various elevations and the road network.

fig. 2.05 (top) Lesser Himalayas region, view of a typical settlement in the valley



fig. 2.06 (bottom) Lesser Himalayas region, view of a typical village. Thulopakhar, elevation 1,450m

fig. 2.07 (opposite page) Higher Himalayas region, Annapurna Base Camp, elevation 4,100m







environments. According to the National Population and Housing Census of 2011, about 50% of the population resides in the Terai region, 43% in the Lesser Himalayas and the remaining 7% are in the Higher Himalayas.⁴ The year is generally divided into dry and wet seasons, with monsoon rains occurring from June to September and playing a critical role in agricultural production (i.e. rice cultivation).

ECONOMY

With 80% of the country living in rural areas, agriculture is the primary source of income for roughly 72% of the population,⁵ with agriculture sector making up 27% of the GDP.⁶ Rice and corn are the two primary staple crops; other agricultural products include millet, wheat, barley, sugarcane, pulses, jute, milk and buffalo meat.⁷ Terai is the most important region for Nepal's economy. It contains flat, fertile and cultivable land, high population density, and easy access to trade routes with India.⁸ However, at higher altitudes of lesser and higher Himalayas, land cultivation becomes increasingly harder. In addition, livelihoods reliant on agriculture are becoming highly vulnerable as monsoon seasons (which are crucial for rice production) are being affected by climate change.⁹

Having eight of the ten highest mountain peaks in the world, tourism industry has a big impact on Nepal's economy, as its total contribution to the GDP in 2016 was 7.5%, estimated to rise to 8.3% by 2027.¹⁰ In 2017, over 940,000 international tourists have travelled to Nepal, nearly a 25% increase from the previous year.¹¹ Tourism is focused on adventure activities such as mountaineering, trekking, rock climbing, rafting/kayaking/canoeing, and paragliding, as well as religious and world heritage sites.

Nepal's economy is also highly reliant on remittances (money transferred by migrant workers back to their families in their home countries). In 2017 Nepal was the 4th highest remittance recipient in the world,¹² with remittances accounting for approximately 30% of its GDP.¹³ Officially, the Department of Foreign Employment issued over 3.5 million labour permits between 2008 and 2017.¹⁴ Currently, it is estimated that around 4 million Nepalis are working abroad,¹⁵ mostly in the construction sector or as domestic workers in Malaysia, Qatar, Saudi Arabia, UAE, Kuwait and South Korea.¹⁶ Lack of employment, particularly in rural areas of Nepal, as well as higher wages promised internationally, are pushing more and more young adults (primarily male) to move abroad to help

fig. 2.08 (opposite page, top) Vast agricultural plots in semi-rural and rural settlements; Trishuli, Nuwakot District

fig. 2.09 (bottom) Tourism is a major contributor to Nepal's economy
photo: Annapurna Base Camp lodges

support their families.

Being a landlocked nation, access to trade is a massive obstacle to development in Nepal. In 2016, Nepal exported \$696 million and imported \$6.51 billion, resulting in a \$5.82 billion negative trade balance.¹⁷ India is the largest trade partner (accounting for \$4.52 billion in imports), followed by China (\$863 million) and UAE (\$348 million).¹⁸ Nepal's largest imports are refined petroleum, gold, motorcycles, cars and rice.¹⁹

POLITICAL INSTABILITY & CORRUPTION

While Nepal has never been colonized, it has been overwhelmed by corruption and political instability for decades, which became a major hindrance to its development. The monarchical regime that started in 1768 with the unification of Nepal has kept the country in a tight grip until 1951, when the Rana rule was overthrown. Between 1950s and 1990s the power continuously shifted between the newly established government and the royal rule, until the violent Maoist rebel revolt (which lasted between 1995-2006 and resulted in thousands of casualties) has finally succeeded in reinstating the government, officially abolishing the monarchy and declaring Nepal a Federal Democratic Republic in 2008. The constitution of Nepal was successfully passed in 2015, defining it as an “independent, indivisible, sovereign, secular, inclusive, democratic, socialism-oriented, federal democratic republican state.”²⁰

INFRASTRUCTURE

As majority of the country lies within a mountainous terrain, infrastructural projects in transportation and energy sectors have been a major challenge, and consequently a massive obstacle for the nation's development. While major highways and roads in urban centres such as Kathmandu and Pokhara are paved, rural areas are often connected to main transportation arteries through unpaved dirt roads, which often become inaccessible during heavy monsoon rains. Landslides are also very common during the monsoon season, restricting access to many villages and making delivery of supplies an enormous challenge.

Nepal is still highly reliant on traditional means of energy generation, with 88%

of all energy needs supplied by biomass.²¹ Majority of the energy comes from wood, yet this natural resource is not being managed sustainably. Approximately 44,000ha are being deforested annually, with only 4,000ha being replanted.²² Thus, deforestation is emerging as an immense issue as population, and consequently the energy demands, are growing, and more land is being cleared for cultivation.²³

An estimated 6,000 rivers, with the total length of about 45,000km, provide Nepal with an 83,000MW hydropower potential. If realized, it would provide enough for all of Nepal's energy needs and produce a surplus for export to neighbouring countries.²⁴ However, less than 1% of it is being utilized, and electricity accounts for just 2% of the nation's total energy supply.²⁵ Even at this capacity, power supply is highly unreliable, with many regions facing prolonged outages on daily basis.

According to the Nepal Demographic and Health Survey (NDHS) (2016), 95% of households have access to an improved potable water source.* However, only 33% have water piped to their house or property, 20% use a public tap, and 36% use tube well or a borehole.²⁶ In addition, only 62% of households have access to improved toilet facilities, 22% use shared facilities and 15% have no facilities at all.²⁷ Nonetheless, NDHS reports that this is a substantial improvement, as the rate of access to improved toilet facilities has nearly doubled from 38% in 2011.²⁸

*** Improved potable water**

source: "sources of water [that] protect against contamination so that water is more likely to be safe to drink."

source: NDHS, 2016

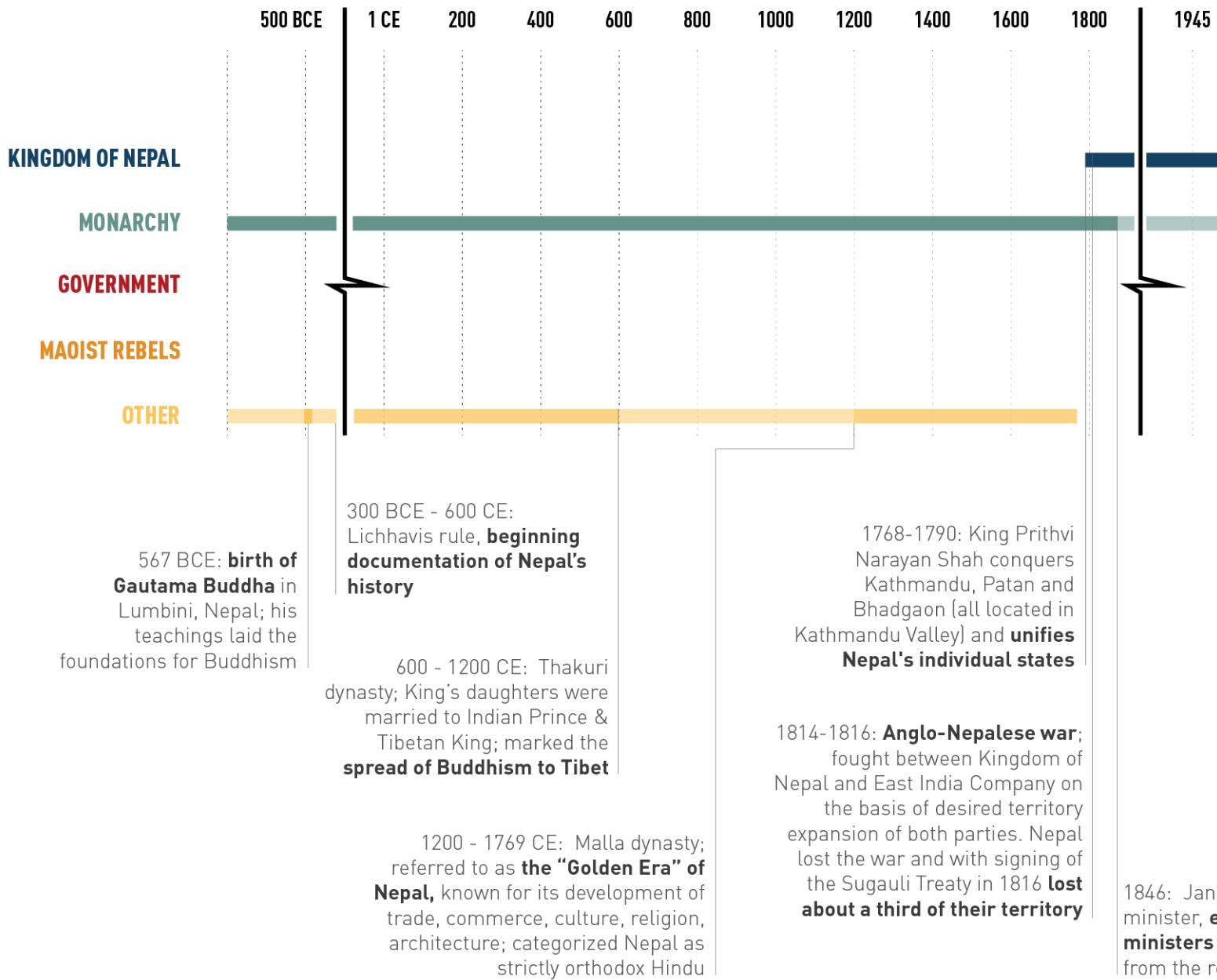


fig. 2.10 (top) Political timeline of Nepal

fig. 2.11 (left) painting of Gautama Buddha teaching in the Deer Park

fig. 2.12 (right) Nepali soldiers during Anglo-Nepalese war, 1815-1816

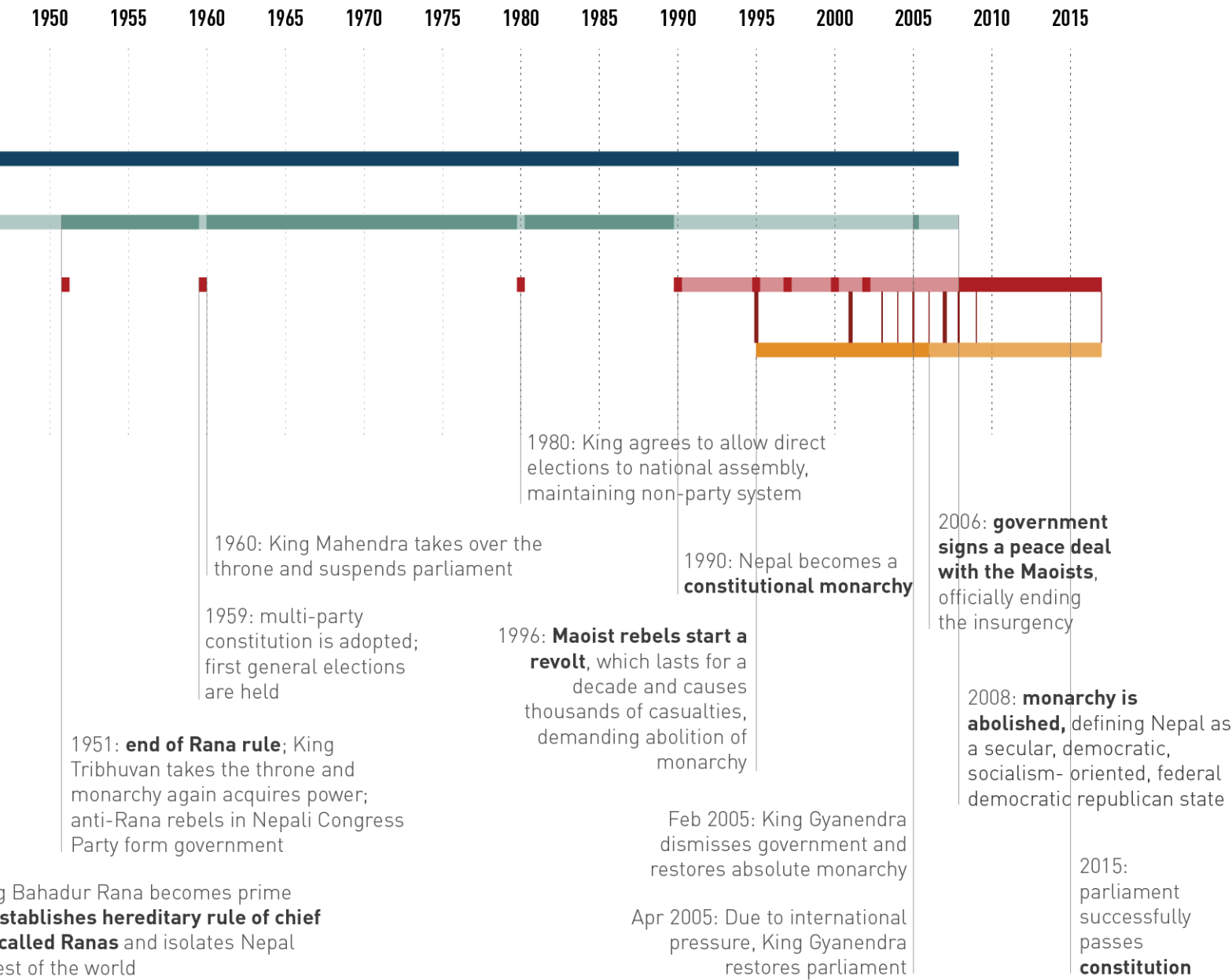
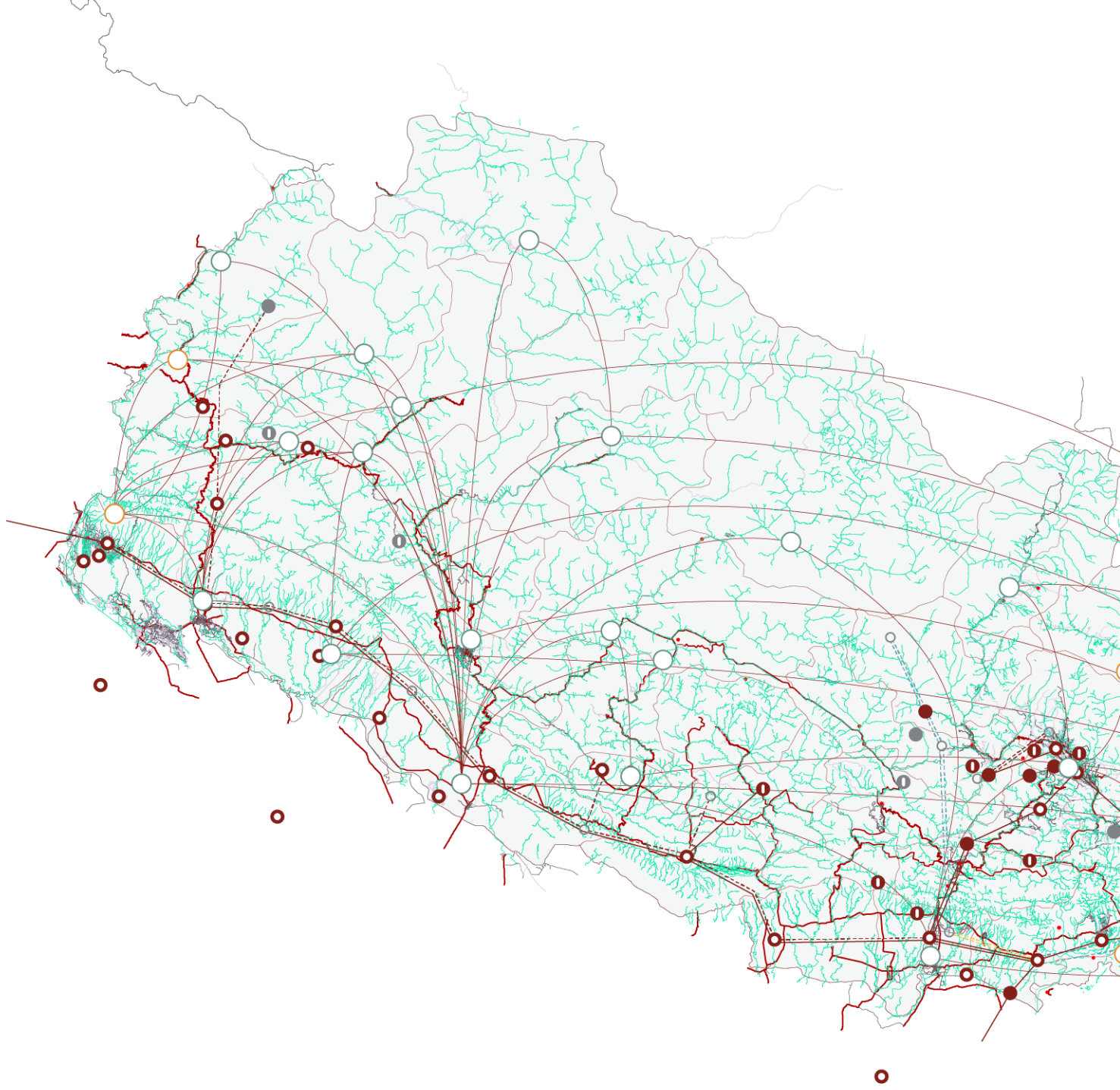


fig. 2.13 (left) His Majesty the King of Nepal at Wilingdon Aerodrome, New Delhi, 1951



fig. 2.14 (right) 80-year-old Nepalese woman shows her voter registration card for historic Nepalese Constituent Assembly elections, 2008

photo: UN Photo /Nayan Tara



POWER NETWORK

- grid sub-station, existing ○ grid sub-station, under constr.
- hydropower station, existing ● hydropower station, proposed
- IPP hydropower station, existing ● IPP hydropower station, proposed
- multi-fuel power station, existing ● multi-fuel power station, proposed

- 440 kV transmission line
- 220 kV transmission line
- 132 kV transmission line
- 66 kV transmission line

FLIGHT NETWORK

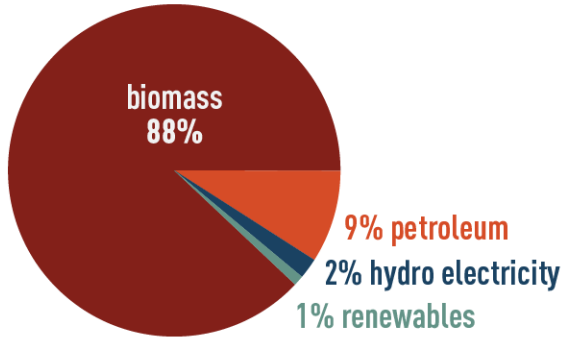
- all weather airport
- seasonal airport
- helipad

OTHER

-
-

fig. 2.15 Nepal's power and transportation infrastructure map

TOTAL ENERGY PRODUCTION



ELECTRICITY PRODUCTION

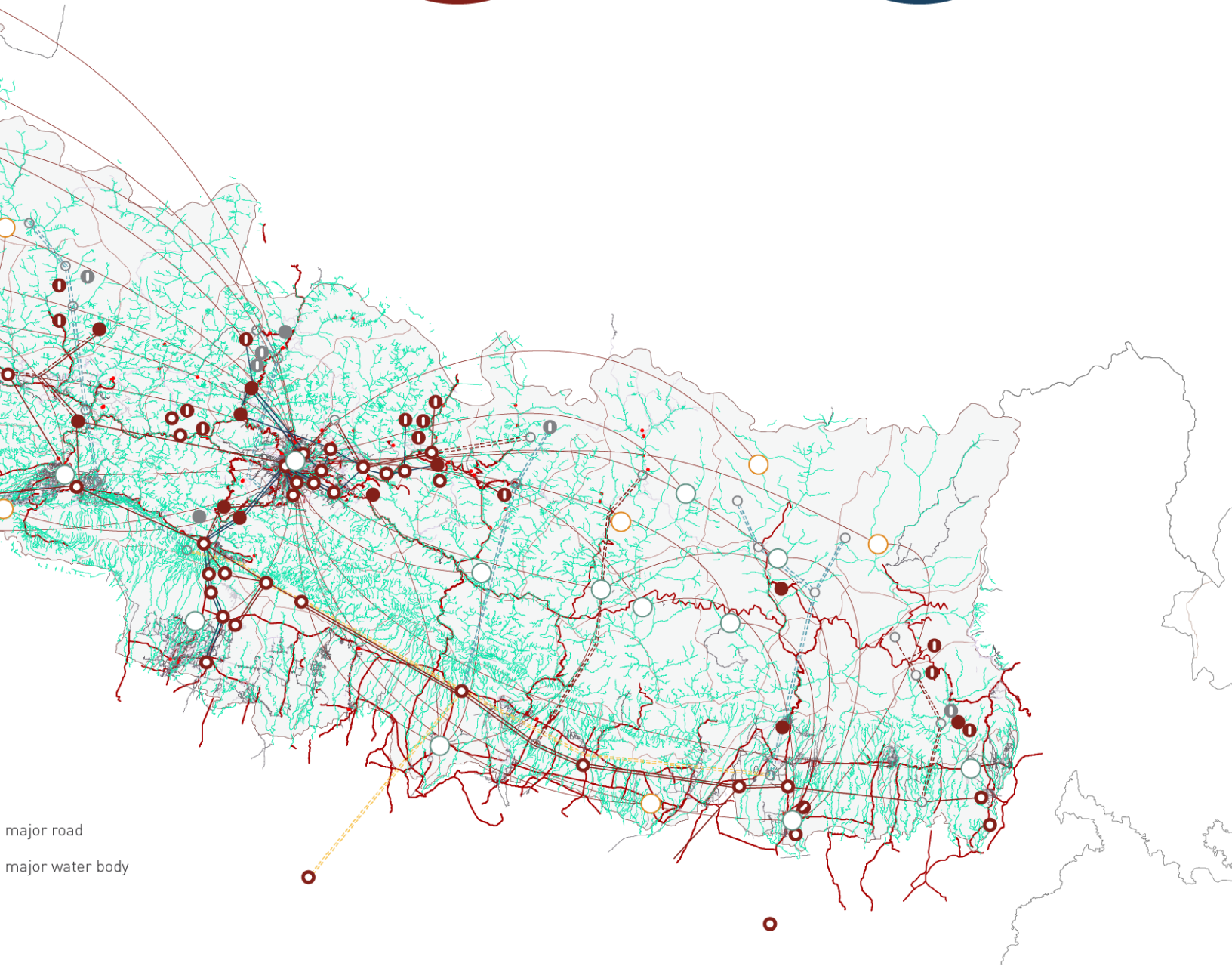
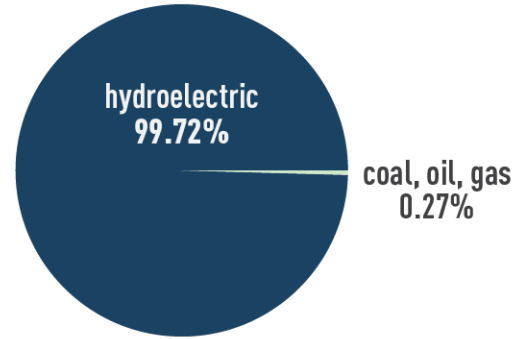


fig. 2.16 Hydropower station in Trishuli, Nuwakot District



fig. 2.17 Hydropower water reservoir in Trishuli, Nuwakot District





fig. 2.18 Traditional clay oven



fig. 2.19 A makeshift stove constructed using a few large rocks as an alternative to a clay oven

LAND OWNERSHIP

Being primarily an agrarian nation, land ownership in Nepal has historically been a symbol of wealth, social status and political influence.²⁹ However, land tenure laws favouring the wealthy elite class of land owners have been a major obstacle to battling Nepal's poverty rates.³⁰ Traditionally, all land was considered to be the property of the state, which was called the Raikar system. Under this framework, a household residing on the land only had the right to its use and what was produced on it.³¹ Under different schemes some land could be allocated to the community, to wealthy individuals, to government workers or for charitable or religious purposes (such as construction of a temple or a school).³² After the end of the Rana rule in 1951, the state slowly started implementing policies to improve the existing ownership models, keeping in mind the interests of people living on the land. While Nepal's Land Act of 1964 provided the tenant farmers with the right to own the land they occupied, as well as capped the amount of property allowed to be owned, most agricultural land is still in the hands of a few owners.³³ It is estimated that more than 37% of the land is owned by just 5% of Nepal's population, with roughly a third not owning any land at all and further millions considered "semi-landless", as the size of the property they own is very small.³⁴ Without officially recognized ownership of the land, families who are cultivating the land for generations are still under the authority of the land owner and have no security over the use of the property. Activists have also been pushing for equal rights for women, who are estimated to own less than 20% of the land.³⁵ Co-owning the land is especially critical for women in rural areas, as they often have no other assets.³⁶

HUMAN TRAFFICKING

Another issue that Nepal is grappling with is human trafficking. The roots of child trafficking industry can be traced back to the rise of Maoist rebels in 1990s.³⁷ In order to power the revolt, Maoists implemented the "one family, one child" policy, which specifically targeted small rural villages. Each family had to give up one child as a recruit or suffer severe punishment. Terrified for the safety of their children, parents were desperately trying to protect them from conscription. This desperation became a perfect opportunity for exploitation for those in the trafficking trade. A person would come to a remote village and offer to take family's child away to a boarding school in the capital or abroad, where he/she would be fed and well educated, and was promised to return upon

completion of the studies. More importantly, traffickers were offering families an opportunity to spare their child from the civil war. Following the offer, families would give up all of their savings, even borrow money, and hand all of it over to the trafficker along with their child. They had no idea that they were likely to never see their son or daughter again. This set up a perfect stage for the industry to flourish.

According to the National Human Rights Commission (NHRC) of Nepal, in the FY 2015/2016 an estimated 23,200 people were victims of trafficking, with over 70% of victims being females.³⁸ Quite importantly, the NHRC statistics also show that 80.4% of trafficked survivors had no formal education, and 16.2% had only studied until grade 6-10. Statistics for arrested traffickers show a similar trend: 88.4% had never attended school.³⁹

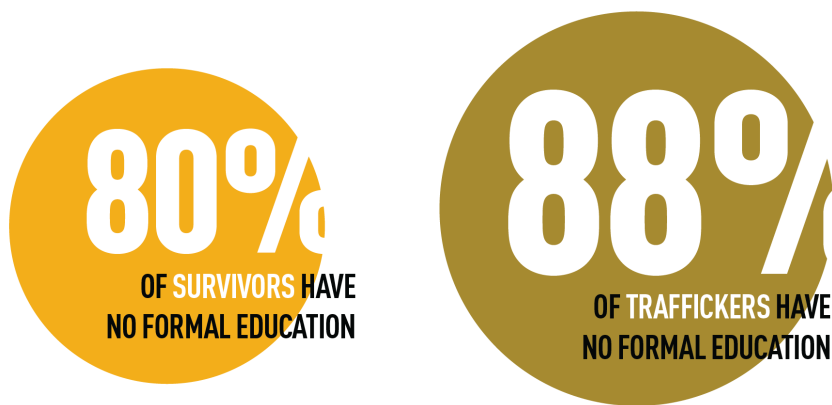
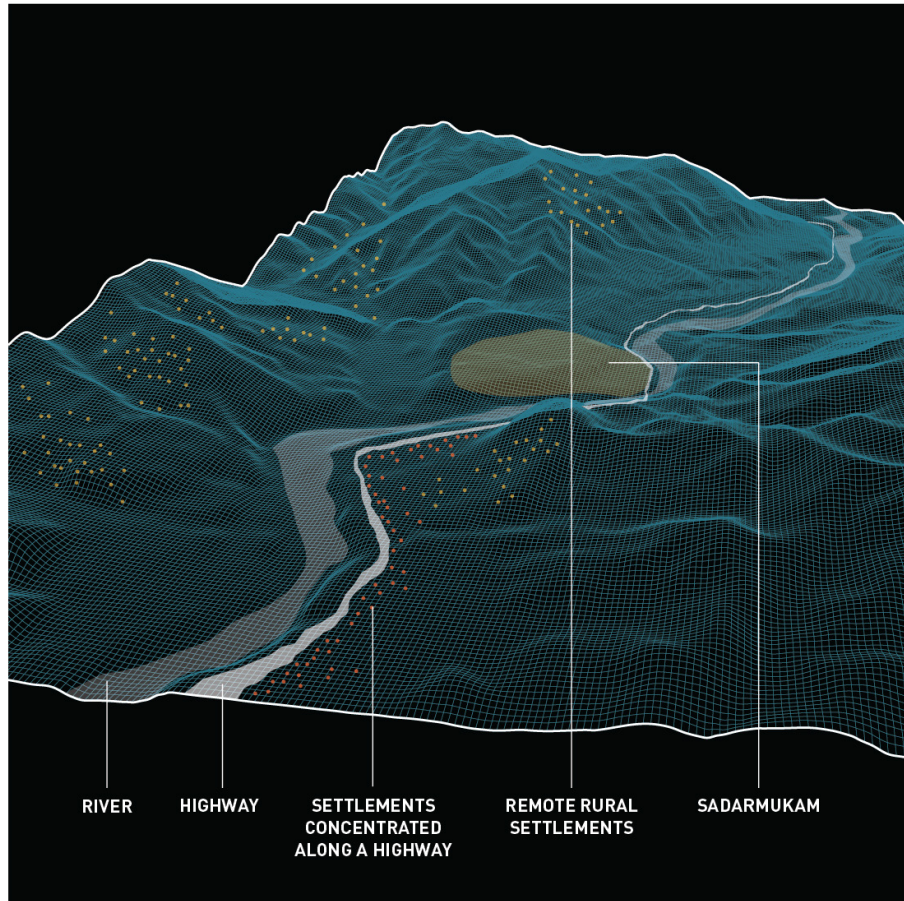


fig. 2.20 Majority of traffickers and victims of human trafficking have never received any formal education

CHAPTER 2.2 COMMON TYPOLOGIES

Nepal's infrastructural development has followed a particular pattern to accommodate for extreme topography changes across the nation. Rural settlements are generally less developed than dense urban areas and lack basic infrastructure such as a secure source of potable water in each household, reliable road network and energy supply. This chapter explores common social, spatial and infrastructural typologies to understand how people have adopted to challenging living conditions in remote areas across Nepal. These observations were made throughout my two visits to Nepal and have guided the development of this thesis.



SETTLEMENT PATTERNS

Extreme topography dictated a typical settlement pattern across the mountainous regions of Nepal. *Sadarmukam* is a semi-rural town, connected to a large urban centre (such as Kathmandu) via a highway and is relatively well developed, typically containing essential facilities such as a hospital, several schools, a bank, a power station, variety of small businesses, governmental offices, etc. It is well connected to the urban centre through public transport. Rural settlements are dispersed among the hills surrounding the *sadarmukam* and generally have no public buildings, aside from a school. Residents of those areas have to travel to a *sadarmukam* to get supplies or go to a hospital. Not all rural settlements are connected by public transport.

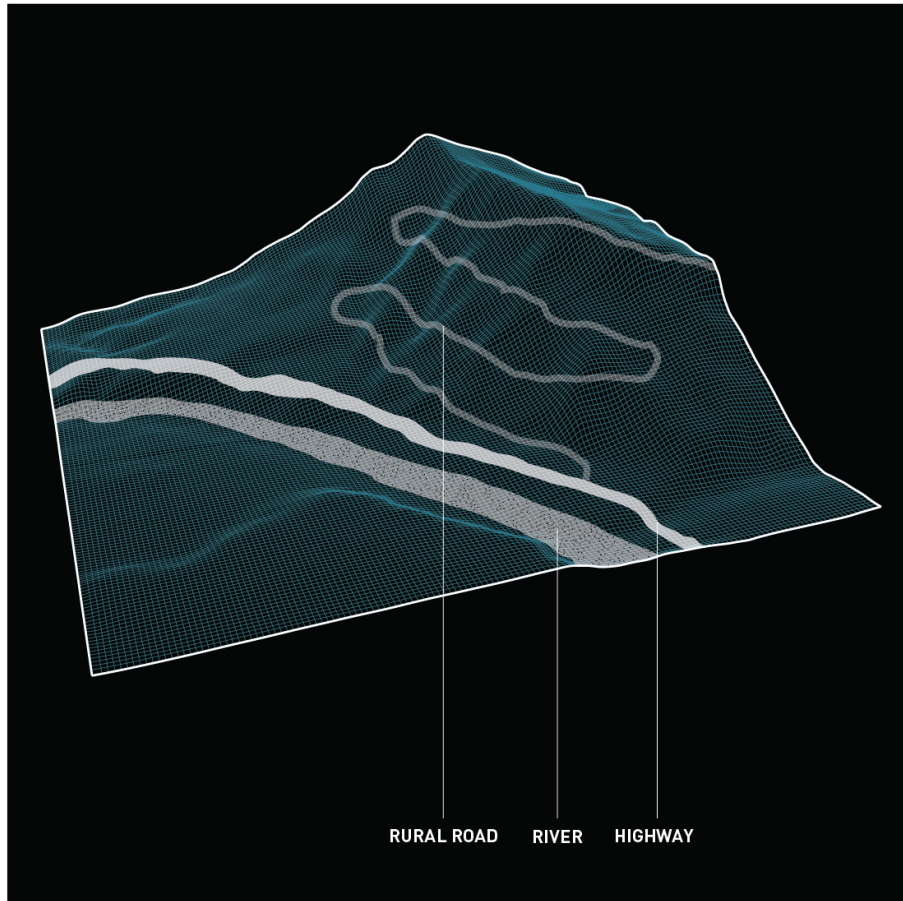


fig. 2.21 (opposite page)
Settlement pattern diagram

fig. 2.22 Higher density
settlements concentrated
along the main road or a
highway



fig. 2.23 Rural settlements
are scattered along the hills
surrounding a *sadarmukam*



ROAD NETWORK

Due to extreme variations in topography, road network typically follows a similar pattern: a paved highway will run in the valley along a river, as the terrain tends to be relatively flat, and smaller dirt roads will branch off into the mountains, connecting higher altitude settlements to the main road. During monsoon season, these rural roads frequently get flooded and blocked by landslides.

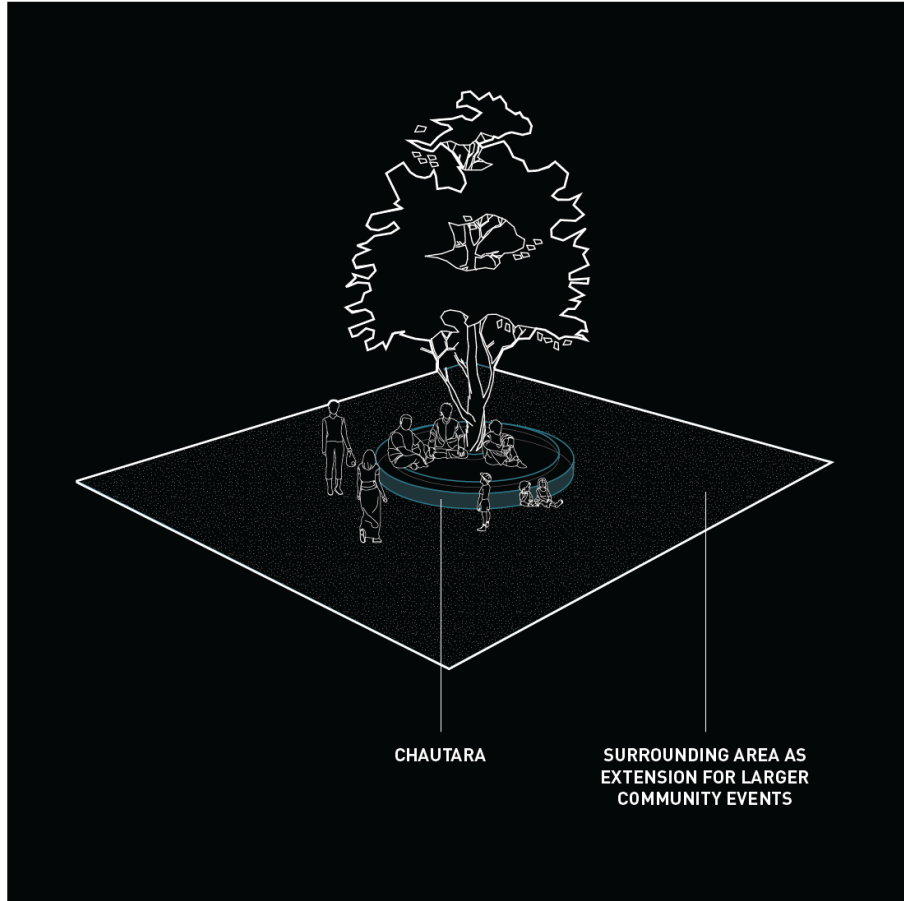


fig. 2.24 (opposite page)
Road network diagram

fig. 2.25 Building a reliable road network within an extreme topography is a major obstacle to development



fig. 2.26 Smaller dirt roads connecting rural settlements to the highway; during monsoon season they often become inaccessible



COMMUNITY SPACE: *CHAUTARA*

Literally translated as “the resting place” from Nepali, *chautara* is a stone platform constructed from large stones and mud under an old tree, where people from the community take rest, meet throughout the day, hold meetings, sleep in the afternoons, and bring their small children to play. In rural communities it is a very common, and often the only, form of a community space.

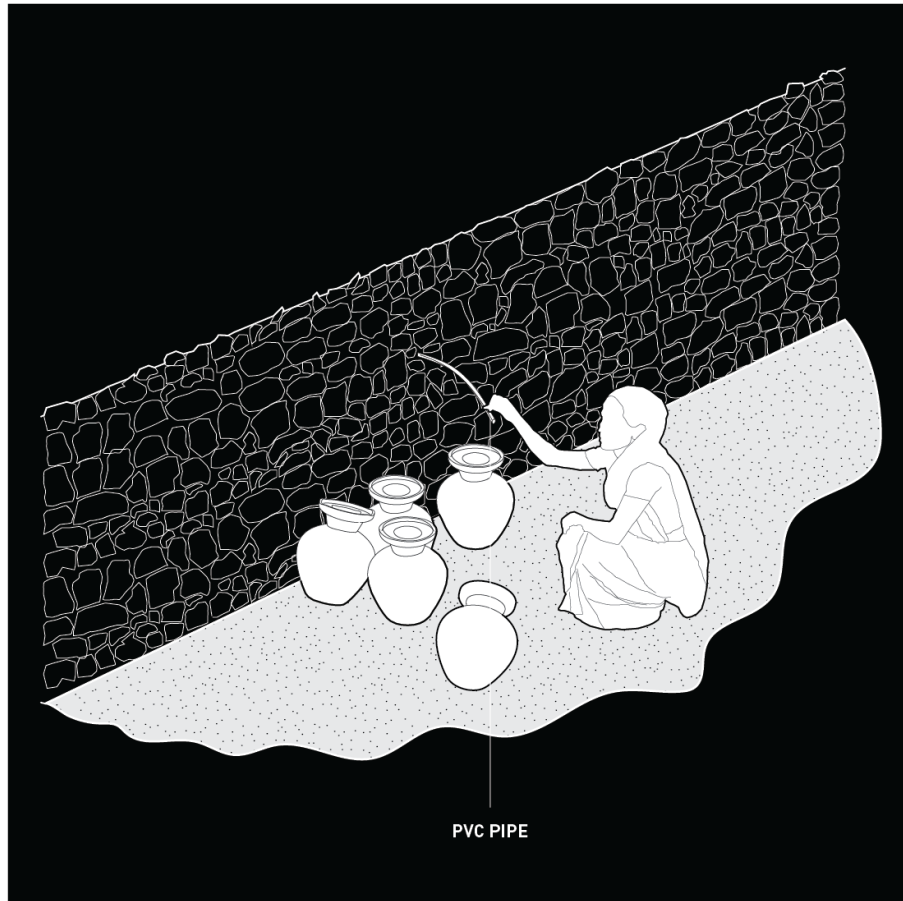


fig. 2.27 (opposite page) Diagram of the most common type of community space: *chautara*

fig. 2.28 *Chautara* as a social gathering place



fig. 2.29 *Chautara* as a resting place on a hot summer afternoon



POTABLE WATER SOURCES

According to the NDHS (2016), 95% of households have access to an improved potable water source. However, only 33% have water piped to their house or property, 20% use a public tap, and 36% use tube well or a borehole. Typically, women are responsible for fetching water for all the needs of a household, such as drinking, cooking, washing dishes and clothes.

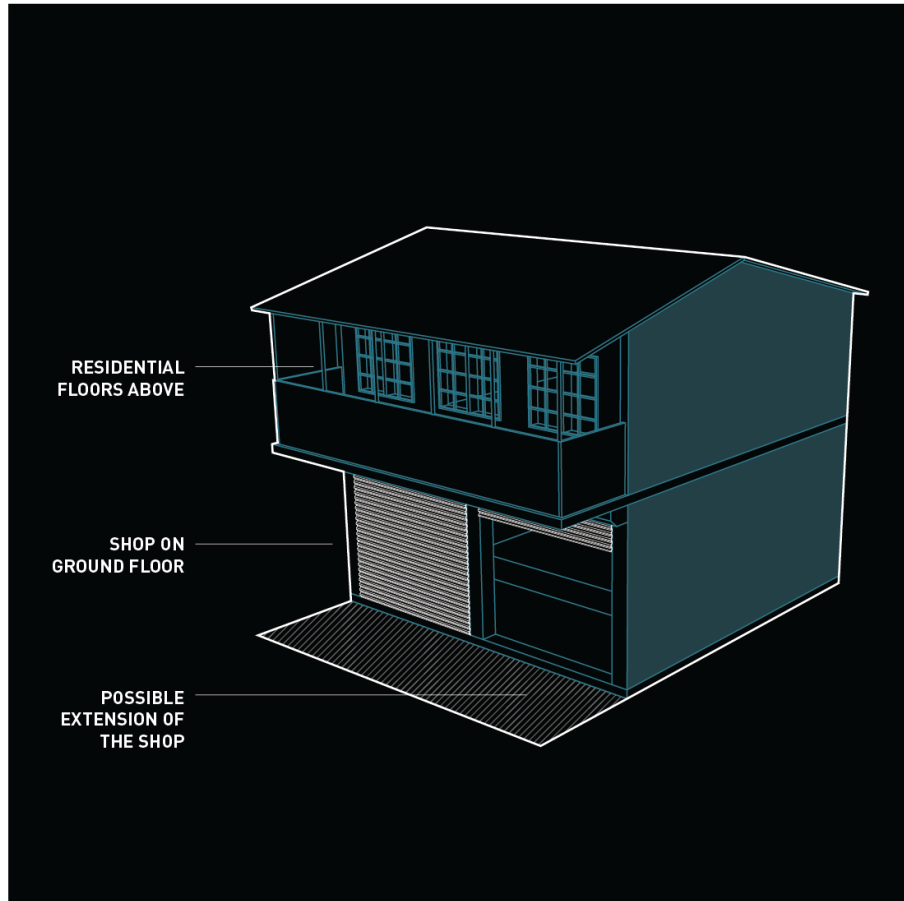


fig. 2.30 (opposite page)
Diagram of a typical water source

fig. 2.31 Public water source; in rural communities it is very common for the water to be supplied by a simple PVC pipe



fig. 2.32 Public water tap, usually shared amongst numerous households



HOUSE: 'MODERN'

A very common housing typology in Nepal consists of a ground floor occupied by a shop which generally sells some basic food items, tea, freshly prepared snacks or small meals. Some are converted into small businesses such as a sewing shop, shoe repair, etc. Upper floors are occupied by the family who own the house or it may be rented out. This housing typology creates residential areas that are simultaneously mini commercial arteries within the town.

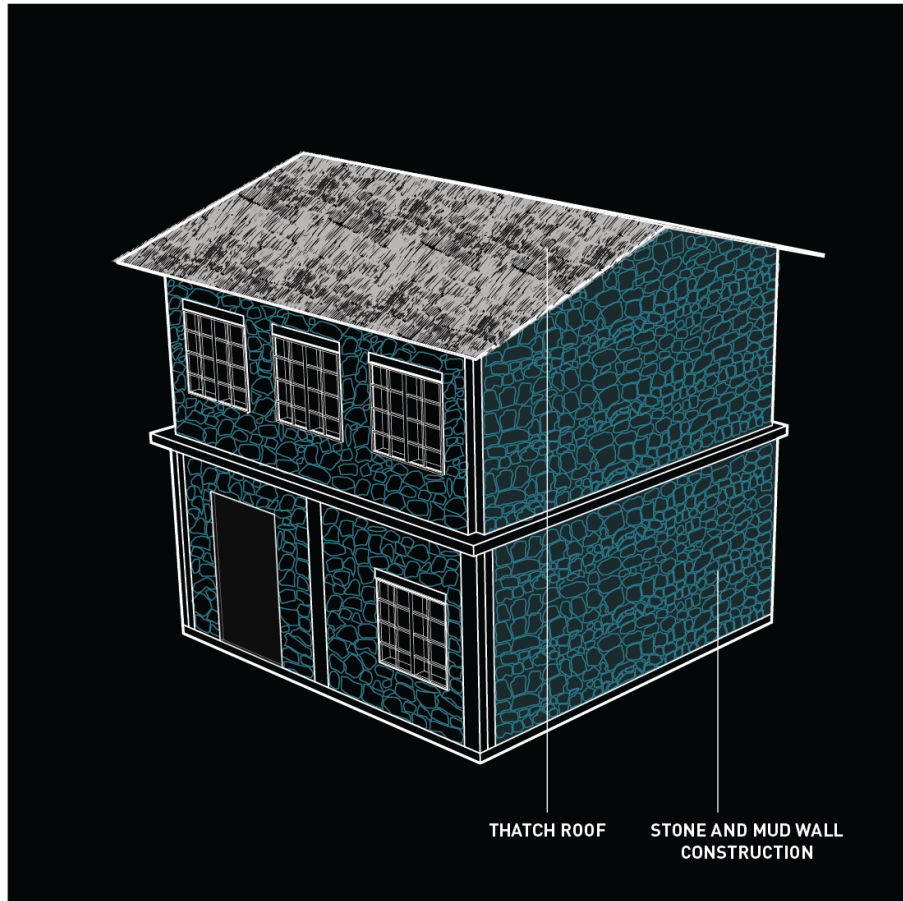


fig. 2.33 (opposite page)
“Modern” house typology
diagram

fig. 2.34 Typical house
typology with three
individual shops on the
ground floor



fig. 2.35 Mini commercial
artery created within a
dense residential area



HOUSE: VERNACULAR

Vernacular construction consists of thick walls made of large stones held together by a mud and water mixture, used as mortar. As many households cannot afford to hire trained masons, more than 90% of houses are constructed by families themselves, according to their needs and financial situations. As they also cannot afford to buy cement and rebar, vernacular buildings typically lack seismic reinforcing and are known to perform poorly under earthquake loading.

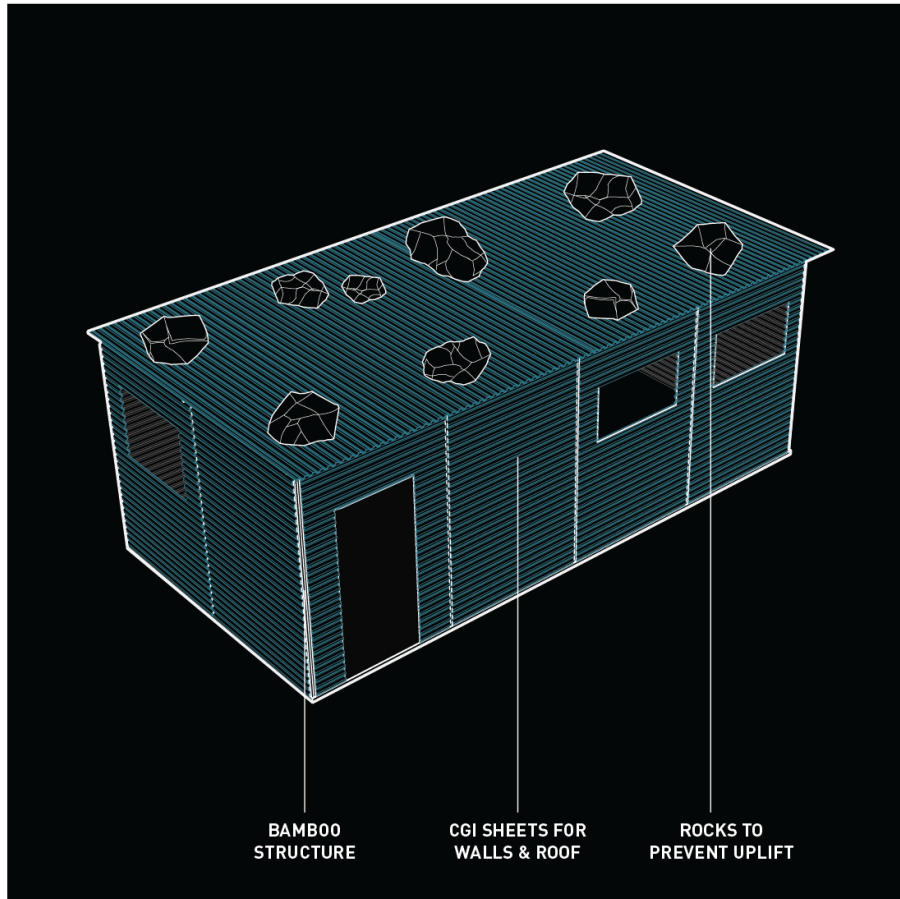


fig. 2.36 (opposite page)
Vernacular house typology
diagram

fig. 2.37 Typical house in a
remote rural village, built
using vernacular techniques



fig. 2.38 Layers of stones
make up the thick
walls, however with
mud as mortar and no
reinforcement they are
easily damaged under
earthquake loading



HOUSE: TEMPORARY

Many families live in temporary shelters for years after a disaster. After the earthquake, government distributed sixteen CGI sheets per family as emergency relief supplies, but that's nearly not enough to provide shelter for a five person family, so tarp is often used as a substitute for CGI. Rocks and old car tires are placed on the roof to prevent uplift during heavy monsoon storms. Temporary schools are also constructed using the same method, especially in rural areas.

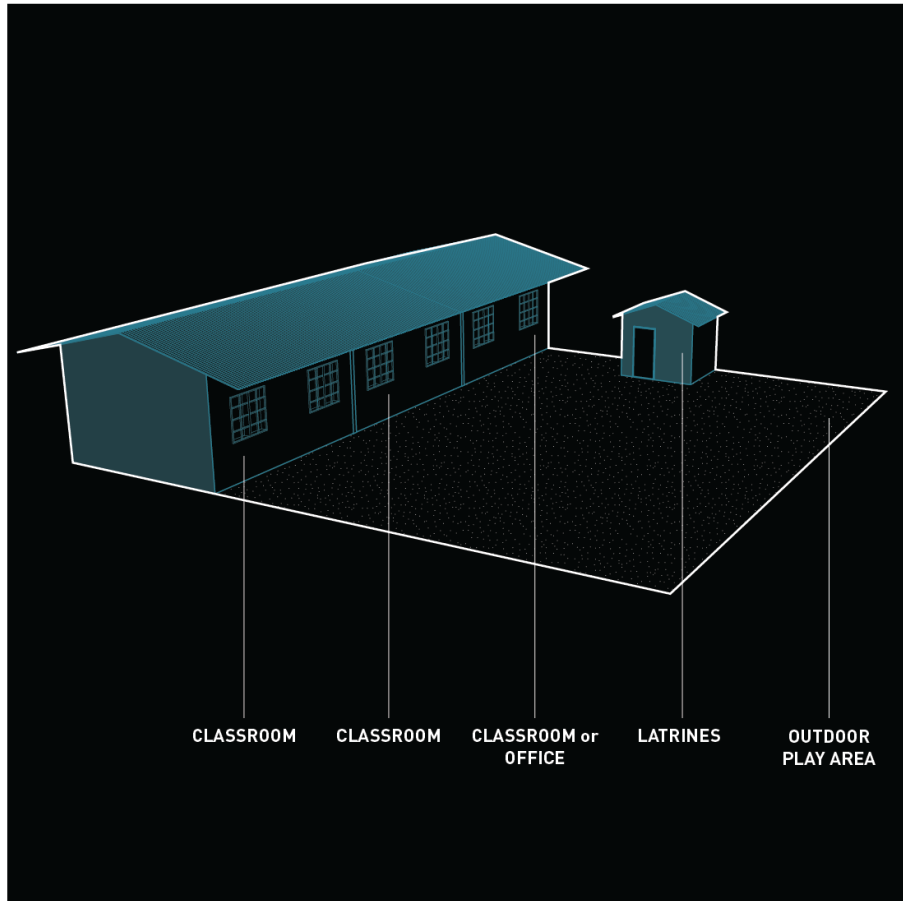


fig. 2.39 (opposite page)
Temporary house typology
diagram

fig. 2.40 Two years after the
earthquake, many families
still live in temporary
shelters



fig. 2.41 Temporary houses
often incorporate a shop to
help the family secure an
income



PUBLIC SCHOOLS

Public schools are severely underfunded and generally don't have any facilities besides the classrooms; sometimes one of the classrooms is converted into a teachers' office. Outdoor play area is typically an open field in front of the school, sometimes containing a playground.

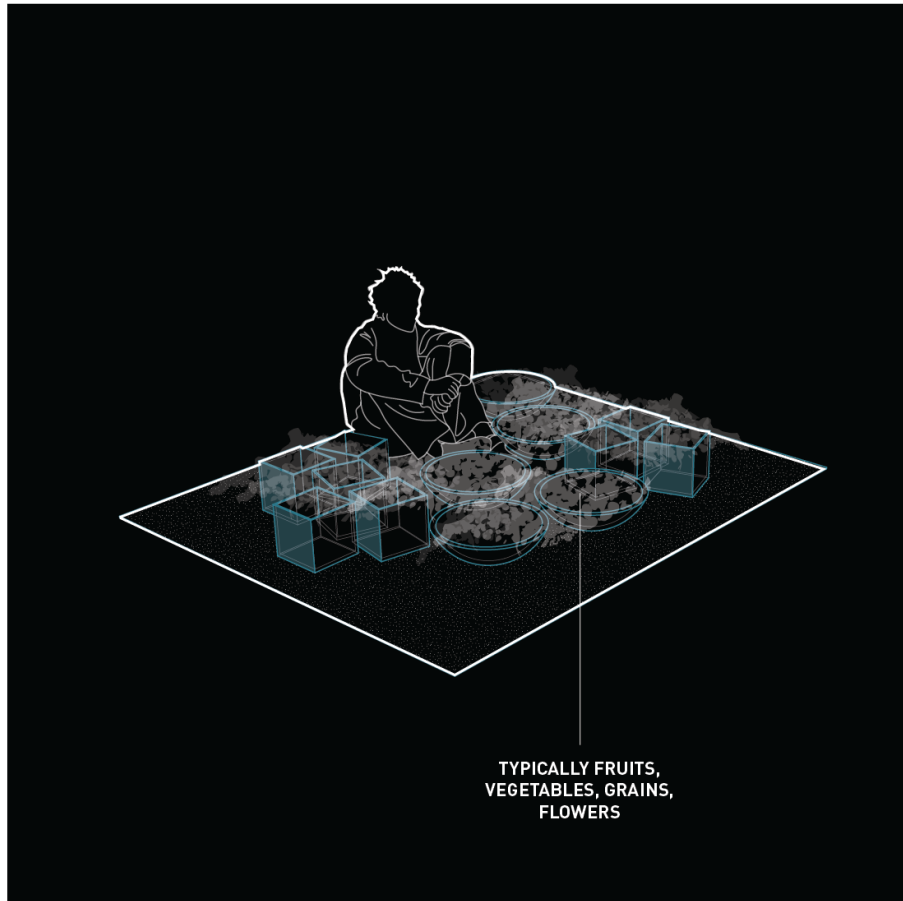


fig. 2.42 (opposite page)
Public school typology
diagram

fig. 2.43 Permanent public
school



fig. 2.44 Temporary public
school; in some regions
children can be attending
temporary schools
for several years while
permanent schools are
being reconstructed



STREET VENDOR

Lacking a designated market space, vendors often turn to selling their product right on the street, displayed in boxes or baskets. This allows vendors to be flexible in the location- they can move between a tourist zone to a busy commercial street, depending on the time of the day.



fig. 2.45 (opposite page)
Diagram of a typical
market condition: street
vendor

fig. 2.46 Some vendors set
up an unofficial market in a
public square



fig. 2.47 Smaller vendors sell
their product on the side of
a busy street



STREET VENDOR WITH A CART

Investing in a cart gives the vendor a lot more mobility, as he can move through the city with the daily routine of the residents. These carts can have propane tanks attached to them so fresh hot food can be prepared on the go.



fig. 2.48 (opposite page)
Diagram of a typical
market condition: street
vendor with a cart

fig. 2.49 Fruit vendors using
bikes to move the produce
along a busy street



fig. 2.50 A cart is less mobile
than a bike but fits a greater
amount of produce

CHAPTER 2.3

EARTHQUAKE 2015

" It is important to be vigilant about how the earthquake is remembered, for this process is complicated by political opportunism, the moral drift of humanitarianism and the hyperbole of disaster capitalism.

- E. Simpson and
M. Serafini

It has been long theorized that natural disasters are primarily sociopolitical constructs, argument being that calling natural disasters “natural” is a misnomer.¹ The degree to which the forces of nature transform into a disaster is a factor of the population’s exposure to the natural hazard and the government’s capacity to respond to it.² Thus, political and economic factors play a significant role in determining the degree of the devastation. Referencing Paul Richards in their paper “Taking the naturalness out of natural disasters,” Phil O’Keefe, Ken Westgate and Ben Wisner argue that it would be more appropriate to replace the term *natural* with *social* or *political* disaster.³ Thus, the economic and political disasters can be seen as a second disaster following the devastation due to the forces of nature. What follows after the initial response is the reconstruction of the affected areas. As Edward Simpson and Michele Serafini write in *Disaster Politics*, “reconstruction is a messy and torturous affair, and often, it is seen as a recurrence of the original disaster,” which consequently becomes the third disaster.⁴ The earthquake that hit Nepal in 2015 became a perfect illustration of all three.

On April 25, 2015 Nepal was struck by a 7.8 magnitude earthquake, followed by a 7.3 magnitude aftershock on May 12. It killed 8,700 people, destroyed or damaged over 755,000 houses and 8,300 schools, and affected an estimated 8 million people. If not for the fact that the earthquake hit on an early Saturday afternoon, when all schools and government buildings were closed for the weekend, and not in the middle of the night, the death toll would have been substantially higher.

The disaster revealed just how vulnerable and unprepared the nation is for an emergency. Government response was widely criticized by the people of Nepal, local and international emergency response agencies and foreign donors. Despite having a *Disaster Preparedness and Response Planning* guidebook published in 2011 by the Home Ministry, first four crucial hours of the response were spent in meetings, as officials were unsure how to proceed amid the chaos.⁵ In the following days, international aid was facing enormous logistic and bureaucratic obstacles. The government continued to tax incoming aid in the same manner



fig. 2.51 Nepal earthquake 2015: statistics

fig. 2.52 Damage from the earthquake. **photo:** ReSurge International



fig. 2.53 US Marines helicopter delivering aid affected regions across Nepal. **photo:** Sgt Mandaline Hatch, Wikimedia Commons





fig. 2.54 Devastation in Kathmandu's district Sankhu. *photo:* USAID DART



fig. 2.55 Rural areas receive relief supplies. *photo:* Lance Cpl. Mandaline Hatch, Wikimedia Commons

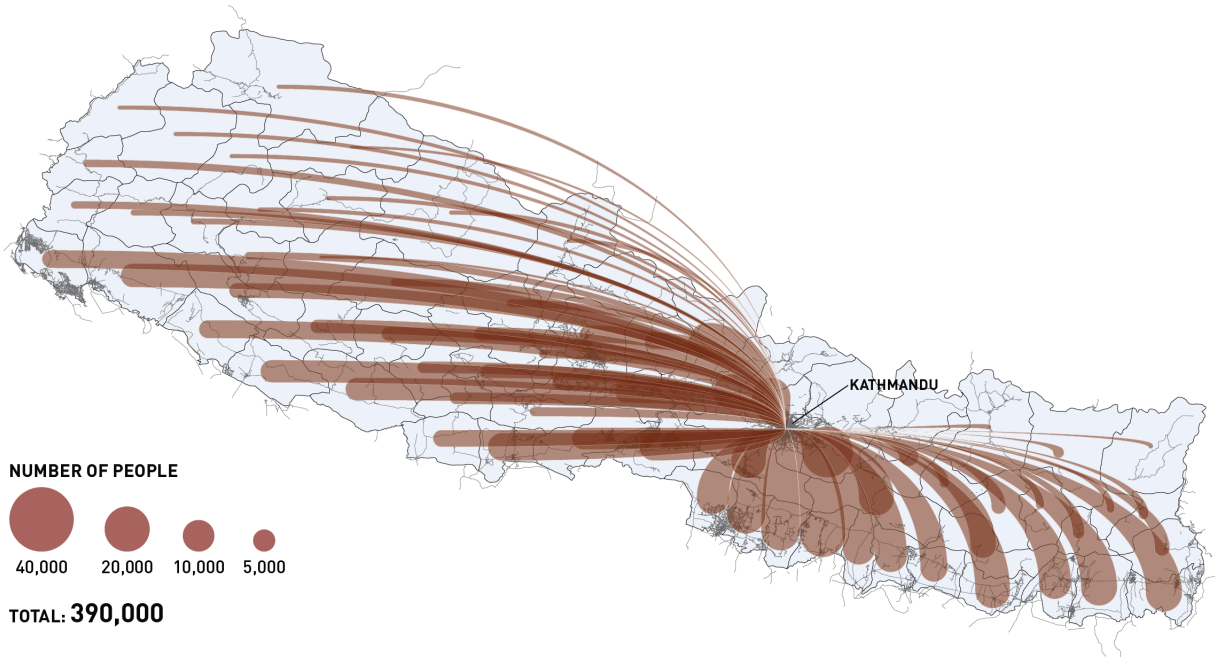
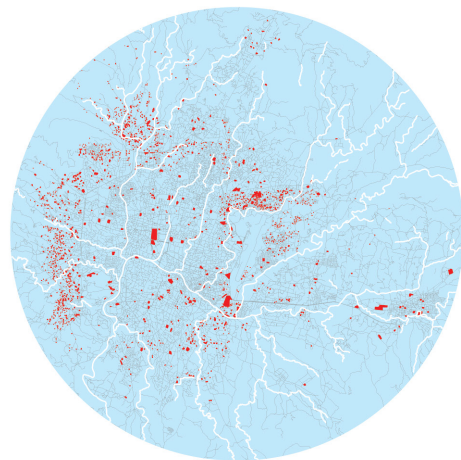
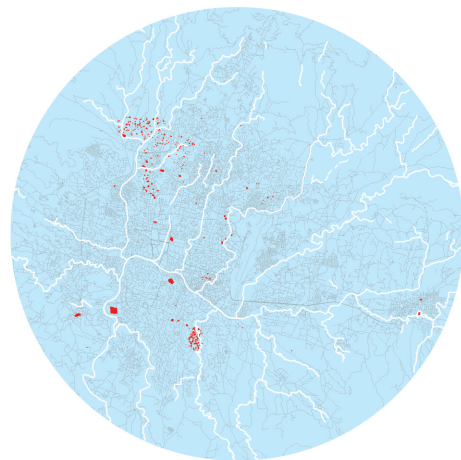


fig. 2.56 Above normal population flows from Kathmandu to surrounding villages after the 2015 earthquake¹⁷



DATE: **APRIL 29, 2015**
 NUMBER: **2 111**
 AREA: **3.27 SQ KM**



DATE: **SEPTEMBER, 2015**
 NUMBER: **296**
 AREA: **0.52 SQ KM**

fig. 2.57 Locations of Internally Displaced Persons camps in and around Kathmandu

that all imports would be prior be to the disaster and private initiatives were blocked as they were considered “unofficial” by the government.⁶ In addition, Nepal’s Central Bank demanded that all financial assistance was sent directly to Prime Minister’s Disaster Relief Fund, which deterred potential millions of dollars in aid.⁷

As emergency supplies, food and trained personnel continued to arrive, it quickly became clear that the main issue was not the lack of available resources, it was the distribution of those resources. The earthquake devastated 14 out of the 75 districts in the country, predominantly affecting remote rural areas at higher altitudes, which made response efforts an enormous challenge.⁸ As the earthquake caused severe landslides in many of the affected areas, it effectively blocked the ability of aid to be distributed by trucks. Helicopters were used for airlifting the injured to hospitals and dropping aid to isolated areas, however Nepal Army faced severe shortages of available aircrafts.⁹ Arrival of army helicopters from India did not provide much support either, as pilots would refuse to fly in cloudy conditions and in hilly areas (as most affected regions in Nepal were).¹⁰ Acknowledging the shortage of national resources, government turned to private helicopter operators, which in turn spent the first few days airlifting climbers from Everest Base Camp.¹¹ Consequently, many affected regions were left without any support for days or weeks at a time, forcing people to gather and share whatever resources and food they could find, rubble their own homes and look for survivors.

Fearful of the aftershocks and unstable buildings on the brink of collapse, people stayed in tents for days or weeks following the earthquake.¹² In Kathmandu, hundreds of Internally Displaced Persons (IDP) camps formed around the city, housing those who have lost their homes. Fearing further aftershocks, epidemic outbreaks, violent riots and severe shortages of food and water, many were trying to flee Kathmandu and return home to their families in rural regions across Nepal.¹³ While the government promised free buses to get people out of the city, transport infrastructure was unable to keep up with the enormous flow of people, making the process incredibly slow.

In the wake of the disaster, UN issued a flash appeal for US\$422 million to assist with disaster response. Not only the appeal was met, it was surpassed with the total of US\$544 million provided in humanitarian aid.¹⁴ Despite being a massive jump in funding from the previous year (a mere US\$11.4 million in 2014),¹⁵ majority of foreign financial support still came from remittances (US\$6.7 billion), which contributed 80% of the total international resources in 2015.¹⁶

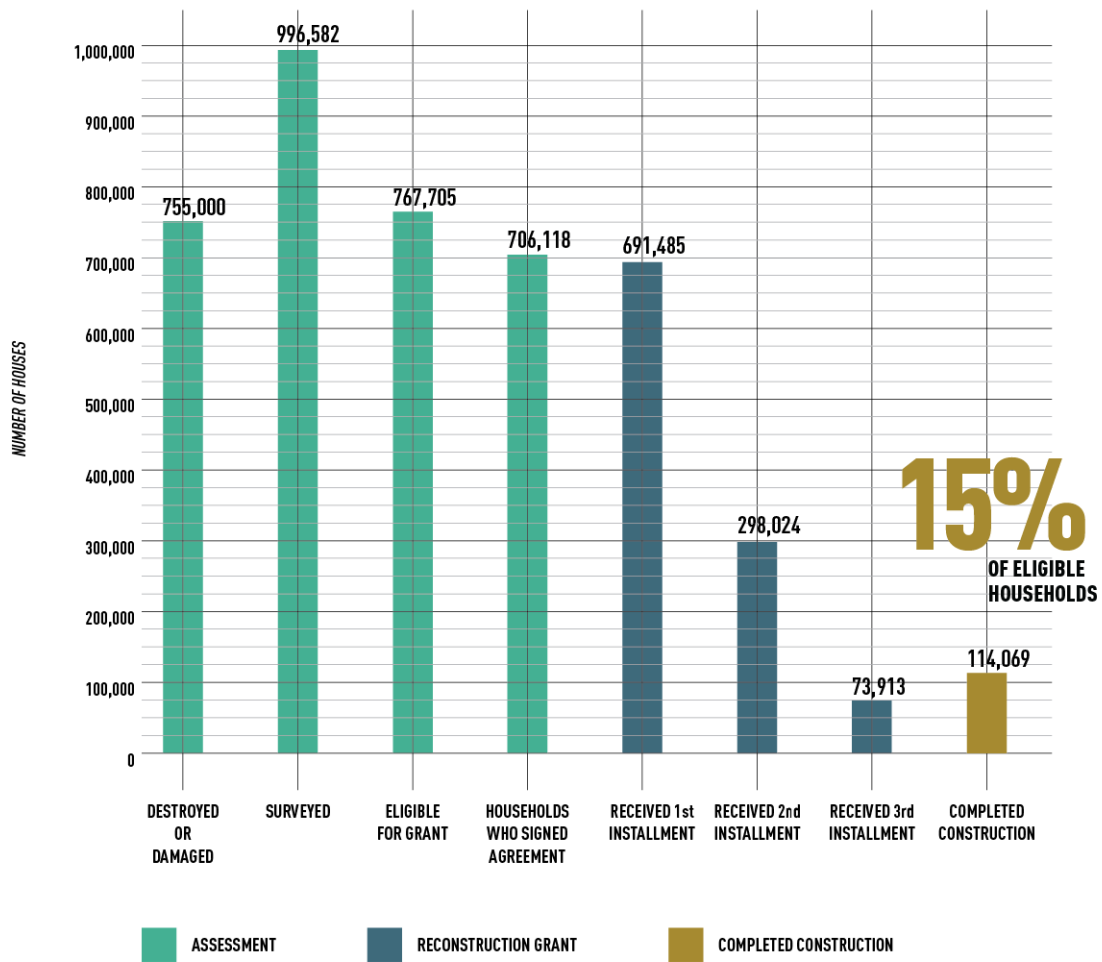


fig. 2.58 Housing reconstruction progress, as of April 2018

As dust began to settle, government of Nepal began to set long term objectives for recovery. It adopted an owner-driven housing reconstruction approach, where beneficiaries would be assisted with technical training on safe housing reconstruction techniques, provided technical support through trained engineers and offered financial assistance in a form of a grant. The reconstruction grant of NPR 300,000 (roughly US\$3,000) would be given out in three installments as the house is being completed. First part is provided after signing the Participation Agreement, second - after the completion of the house up until the lintel level and third - after finishing the roof. As a later amendment in September 2016, it is also mandatory to spend the last NPR 25,000 on toilets, solar systems or a biogas plant.¹⁸ The National Reconstruction Authority (NRA) was formed in December 2015 to coordinate the reconstruction efforts. In addition, Nepal Housing Reconstruction Program released Design Catalogue for Reconstruction of Earthquake Resistant Houses (Volume I in October 2015 and Volume II in March 2017) to assist rural households with reconstruction that would comply with the National Building Code of Nepal.

However, this proved to be a highly problematic approach. In order to be officially listed as a beneficiary and become eligible for the grant, a door-to-door assessment conducted by a qualified engineer had to be done to assess the condition of the house and confirm that the damage is substantial enough to qualify for reconstruction. Due to the lack of trained engineers and remote locations of some affected areas, this step turned into an extensive and challenging process.¹⁹ In addition, as many affected households are struggling to re-establish their livelihoods to the levels prior to the disaster, many are forced to spend the first installment on basic survival needs, such as food, temporary shelter and hospital fees.²⁰ Majority of the households who have received the first part of the grant and were interviewed for the *Independent Impacts and Recovery Monitoring* report (April 2017) said that they had not started the reconstruction process, and only 37% said they were expecting to use the money for the intended purpose.²¹ The report further states that 56% of families whose house suffered complete or major damage have not started reconstruction, citing lack of money (93%) and waiting for the reconstruction grant (43%) as the main reasons.²² Poor communication has also been a major obstacle to the success of the program, as half of the households who have received the first installment do not know what is required of them in order to receive the second installment.²³ Not surprisingly, as of February 2018 (nearly three years after the disaster), only 15% of eligible households have completed their home reconstruction.²⁴

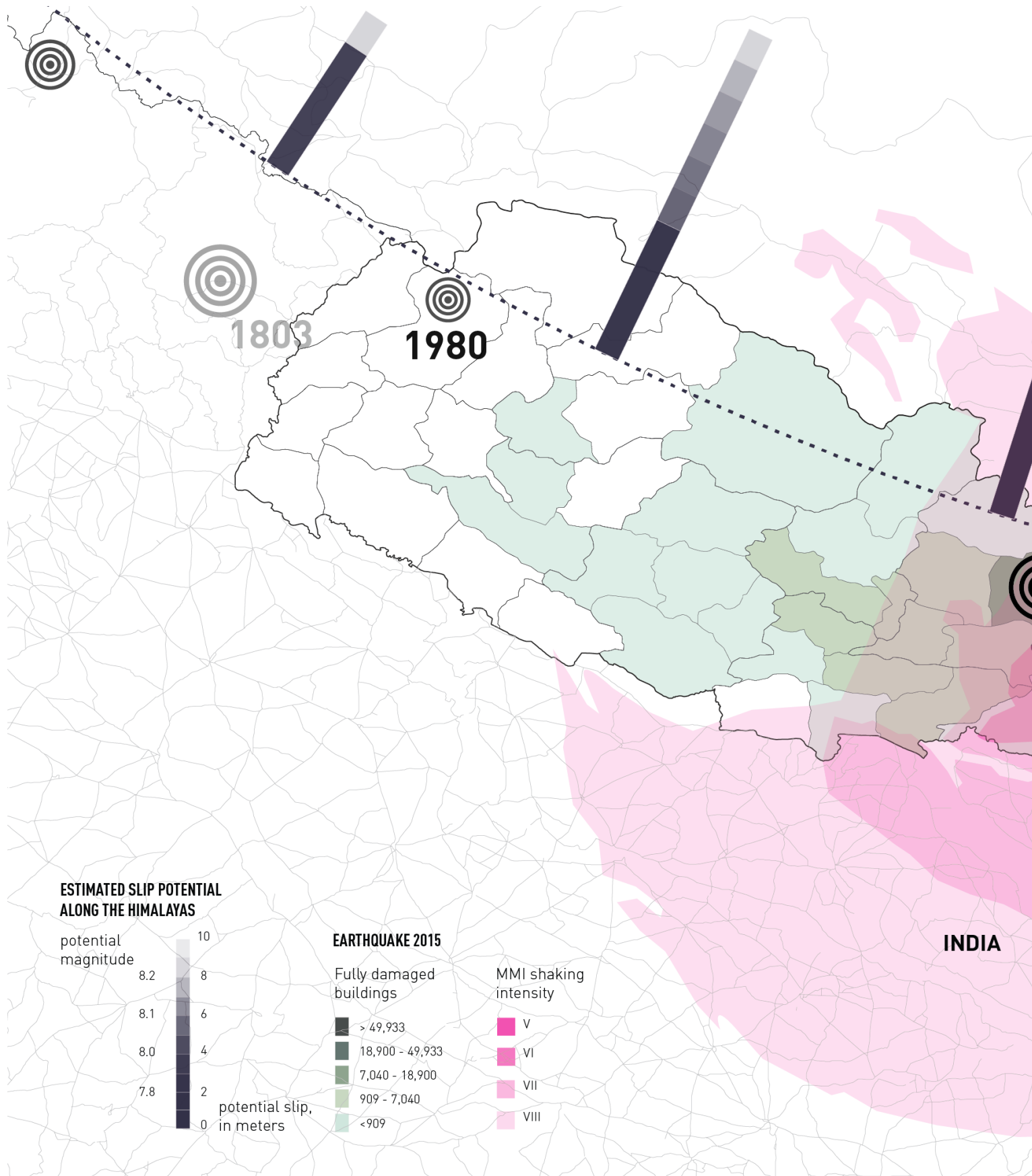
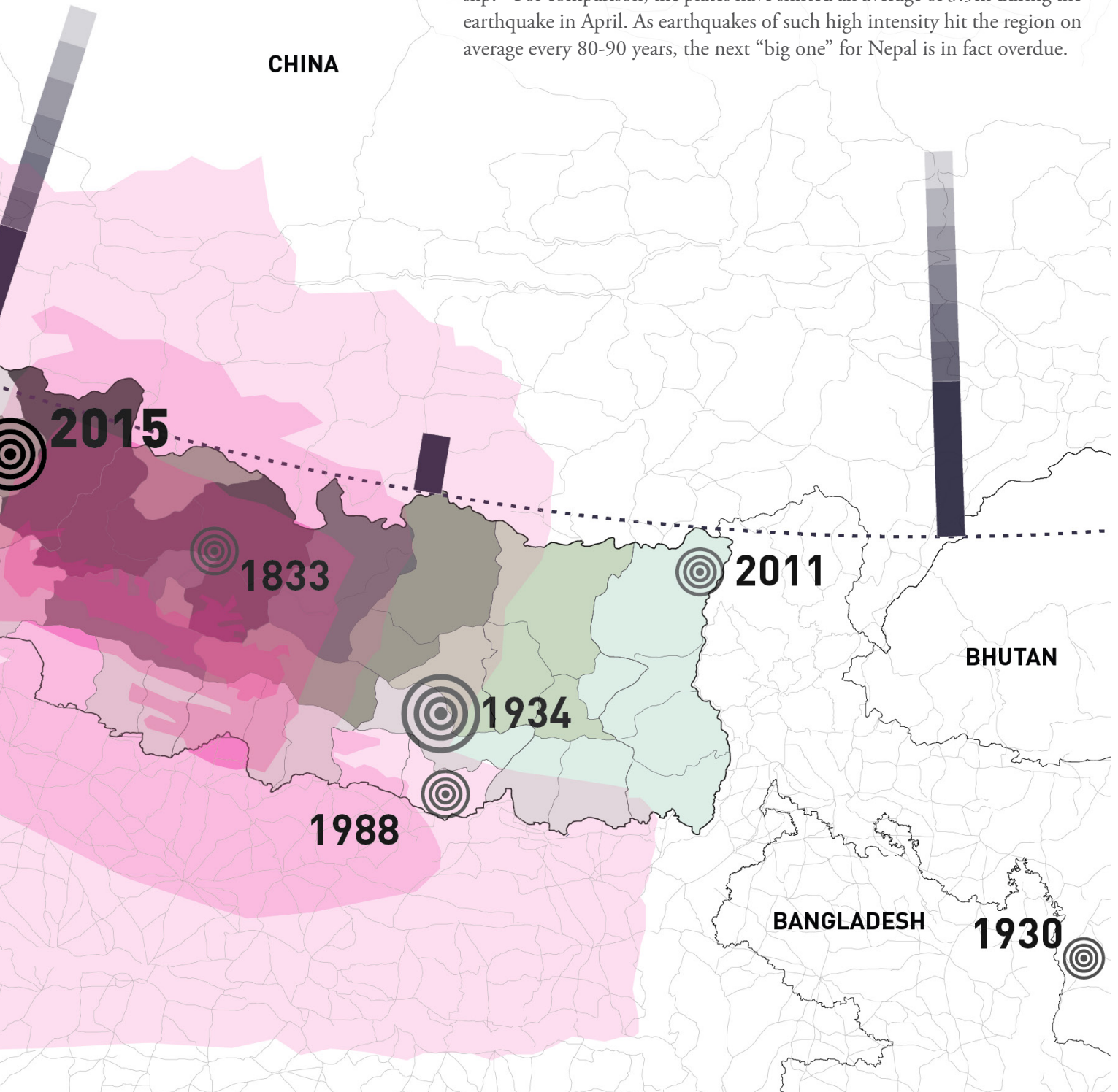


fig. 2.59 Seismic activity in Nepal: historic data and future projections

The importance of strict enforcement of the National Building Code during current reconstruction efforts becomes especially critical as scientists warn of the next inevitable earthquake. Collecting the data from seismic activity in the region dating back to 1500s, scientists are estimating that the region where the fault ruptured in 2015 still contains enough energy for a 10-15m slip.²⁵ For comparison, the plates have shifted an average of 3.5m during the earthquake in April. As earthquakes of such high intensity hit the region on average every 80-90 years, the next “big one” for Nepal is in fact overdue.



CHAPTER 2.4

ROLE OF EDUCATION IN DISASTER RECOVERY IN NEPAL

Nepal has one of the youngest education systems in the world. With the end of the Rana rule in 1951, the Ministry of Education was established in 1952 and education became open to the general public, not just the elite.¹ Public education was structured based on the model utilized in the region, primarily in India.² National literacy rate surged from 5% in 1950s to 64% in 2015. Despite enormous progress, public education sector in Nepal still suffers from severe shortage in funding.

Today, there are roughly 33,000 schools in Nepal, 85% are government-funded and 15% are private schools.³ The disparity between the quality of education between them is quite stark. The passing rate on the School Leaving Certificate (a final exam that allows the student to graduate from grade 10 and start higher education) is hovering around 46% in public schools, while it nearly doubles to 85% in private schools.⁴

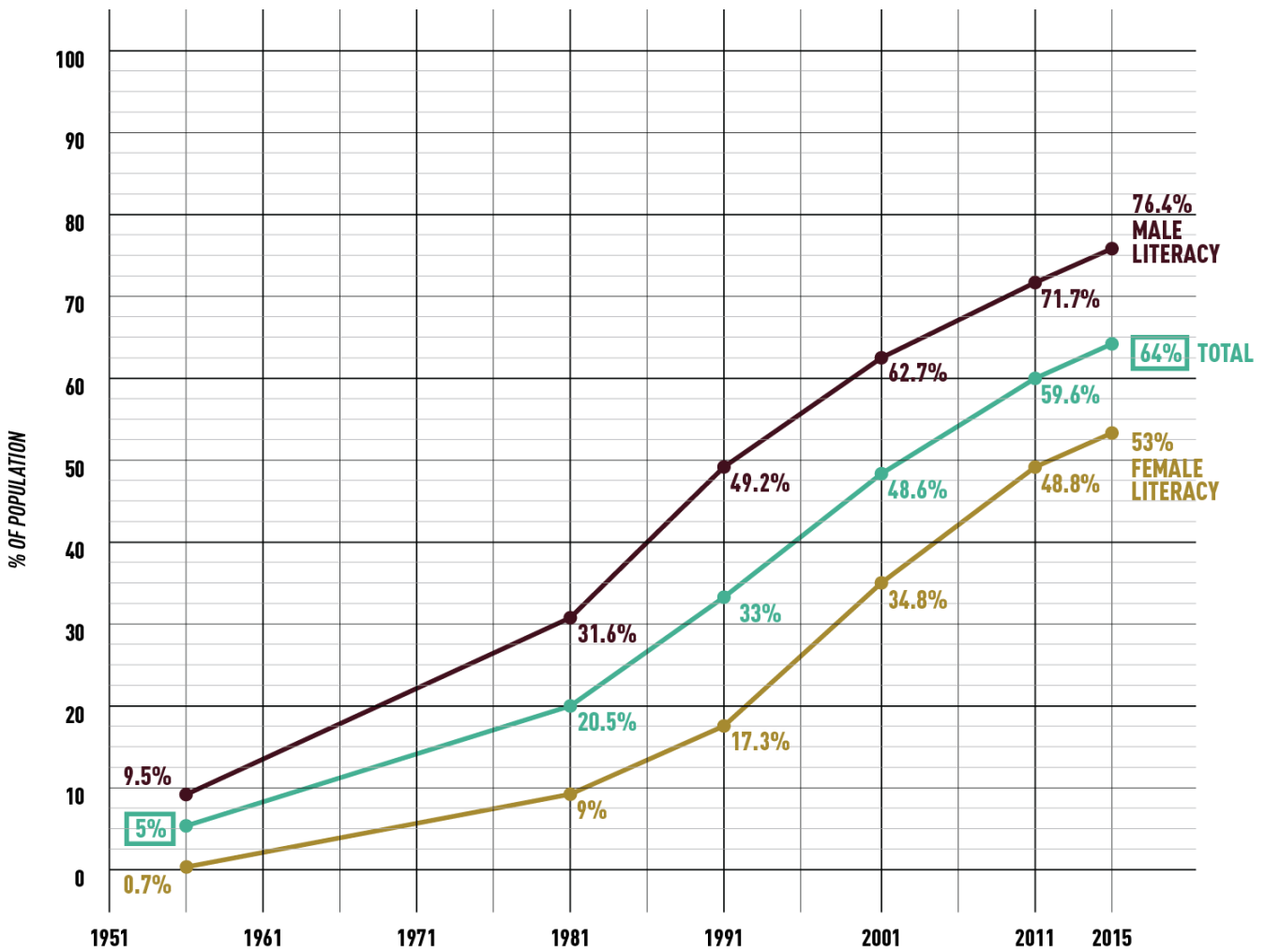
Public schools are generally severely underfunded, do not provide required textbooks, lack adequate facilities and have a shortage of teachers. In addition, while public education is technically free, parents are still facing unofficial fees for uniforms, exams, and school repairs, which can become a substantial financial burden. While private schools are even more financially straining, many families still opt to send their children to private schools as they see it as the only option for giving their children a future.⁵

Poor quality of education becomes a massive obstacle when battling low attendance rates in Nepal. Many families are facing the issue of overcoming opportunity costs, which can be described as the value any activity brings when juxtaposed with the best alternative. When the best alternative to going to school is staying at home and helping one's family on the fields- value of education appears to be low, as it brings no economic benefit in the short term. Parents who cannot afford to pay for private schooling often do not see value in public education, as they realize their children are not likely to pass their graduating exams. Alternatively, keeping their children at home to help work on the fields brings an immediate economic benefit to the family. Traditionally, girls' education

fig. 2.60 (opposite page)
Literacy rates in Nepal
between 1950s - 2015,
showing the disparity
between male and female
literacy rates

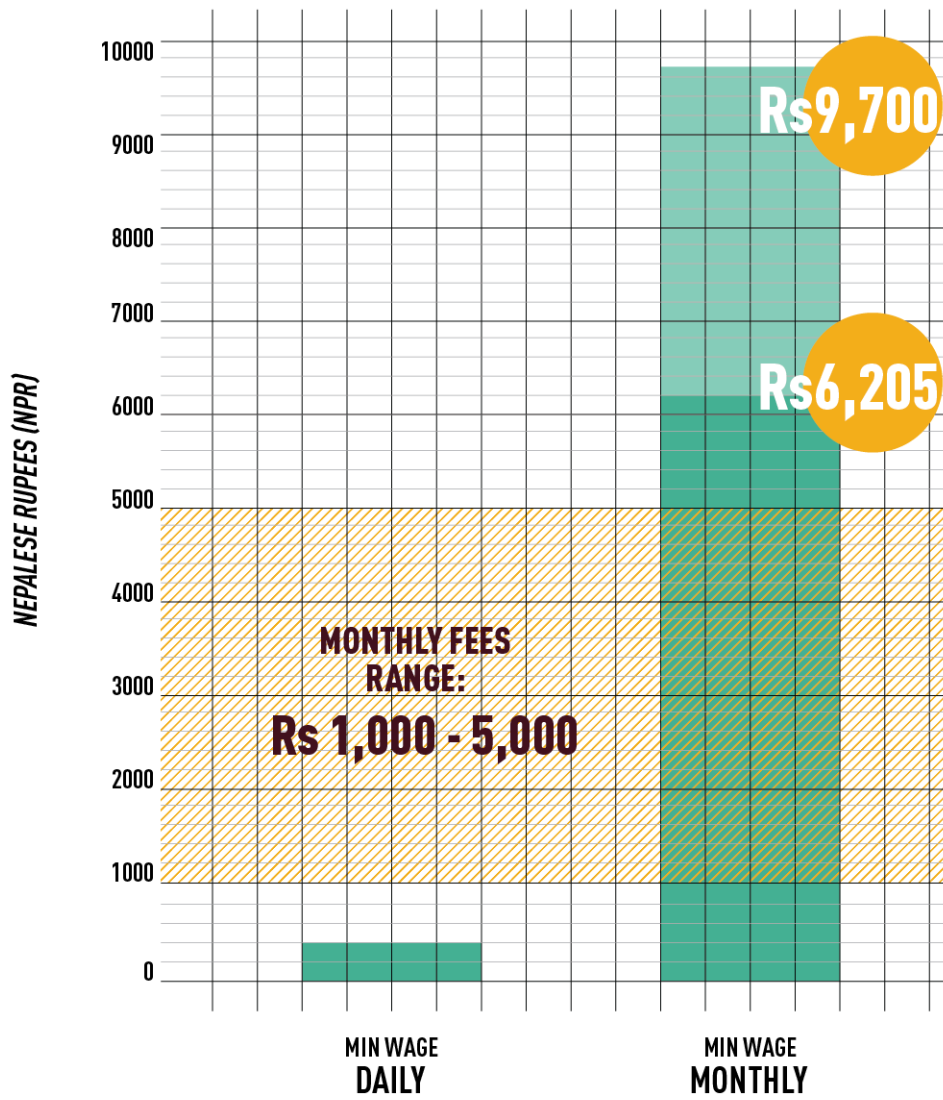
5%
LITERACY RATE IN
1950s

64%
LITERACY RATE IN 2015



NEPAL LITERACY RATES

- LITERACY RATE, ADULT **TOTAL** (% OF PEOPLE AGES 15 AND ABOVE)
- LITERACY RATE, ADULT **FEMALE** (% OF FEMALES AGES 15 AND ABOVE)
- LITERACY RATE, ADULT **MALE** (% OF MALES AGES 15 AND ABOVE)



COST OF PRIVATE EDUCATION IN RELATION TO MINIMUM WAGE IN NEPAL

is valued even lower as women are responsible for more household chores and often stay at home after getting married.

There has been considerable progress in increasing the primary school attendance across Nepal in the past 25 years, however experts warn that the progress can be erased in the aftermath of the disaster.⁶ An estimated 8,300 schools were damaged or destroyed,⁷ with nearly 1 million children unable to return to school.⁸ It is estimated that in the most severely affected districts, 90% of schools were destroyed.⁹

At the time of my visit in 2017, some regions were still waiting for their schools to be reconstructed. In towns where schools remained standing after the earthquake, a lot of parents worried about safety of the construction and were hesitant to send their children to study. Disaster recovery also amplifies the need for children to help their parents on the fields, as families struggle to make ends meet with house reconstruction and reestablishment of their livelihoods. This means that many families will not be able to pay for uniforms and additional fees, unable to afford even the “free” education.

In addition, natural disasters are known to exacerbate child trafficking, as conditions of chaos where children are out of schools, separated from their families, and are often displaced are taken advantage of.¹⁰ With an overwhelmed government and many public institutions collapsed (most importantly schools), child protection mechanisms are no longer in place.¹¹ Chaos in regulations and border control also makes moving people out of the country much easier. Amid the devastation of a natural disaster, it is common for traffickers to pose as relief workers offering help to families, exploiting the desperate conditions many are facing.¹² In the year following the 2015 earthquake, NHRC estimates that 23,200 people were victims of human trafficking, a 40% increase from the previous year.¹³ However, this is a very conservative estimate, as only the rescued survivors or persons officially reported missing can be counted.¹⁴

Recreating child security mechanisms in times of a disaster is the primary reason why many NGOs focus on school reconstruction and not hospitals or homes. As education is often left low on the priority list for recovery, children are left incredibly vulnerable for prolonged periods of time.

fig. 2.61 (opposite page)
Monthly fees for private schools in relation to the official minimum wage in Nepal



fig. 2.62 Public school in Trishuli, Nuwakot District



fig. 2.63 Private school in Trishuli, Nuwakot District



fig. 2.64 Temporary Learning Centre (TLC) in place of a public school that was damaged during the 2015 earthquake. At the time the photo was taken in August 2016, construction of a permanent school was just being completed.



fig. 2.65 Interior of the TLC; classrooms are lacking basic furniture for each student, resulting in some students sitting on the floor, using benches as desks. There is only one teacher for three grades at this TLC, splitting her time teaching between three classrooms throughout the day.





fig. 2.66 Recreating child security mechanisms in times of a disaster is the primary reason why many NGOs focus on school reconstruction and not hospitals or homes. As education is often left low on the priority list for recovery, children are left incredibly vulnerable for prolonged periods of time. *photo:* All Hands and Hearts

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PART III

DESIGN PROPOSAL

overview of the proposal, introduction to site & addressing the challenges on two different scales

CHAPTER 3.1

OVERVIEW OF THE PROPOSAL

Recognizing education as a backbone for recovery, the proposal is focusing on the role of education as a catalyst for sustainable development in the region. Currently, there are numerous government and NGO-funded school reconstruction projects underway that are aiming to return student attendance to pre-disaster levels. However, a presence of a school does not guarantee attendance, as it fails to address the underlying obstacles children are facing to receiving an education. As the government and NGOs are working towards completing school reconstruction, there is no need for the proposal to turn into another formal education facility. The question rather becomes- ***with the infrastructure already in place, how can we encourage children's consistent attendance?*** The question is explored through two parallel streams:

- a. What are the reasons that children drop out of school and how can we promote their consistent attendance?
- b. How is the lack of education among adults putting children at risk and how can we promote education among older generations to remedy that?

As such, the proposal becomes a community hub which acts as a flexible armature for cultivating and strengthening the social network of a community. Instead of being a means of providing formal education, it supports informal education initiatives and hosts a set of programs that aim to address the challenges children are facing to attending school. Broadly speaking, the program is designed to address the financial hardships families are facing, child safety, informal education and emergency support after a disaster. By addressing these obstacles, the aim is for education to become more accessible to many households, specifically those hovering close to or living below the poverty line.

The following section is summarizing these obstacles according to three recovery phases: the stable, emergency and recovery.

OBSTACLES: STABLE PHASE

Nepal is currently in the stable phase of recovery, where people's daily lives have started to return to normal and livelihoods are being reestablished. One of the biggest obstacles that families are facing here is **overcoming the opportunity costs** and the **financial burden of unofficial fees**, as described in the previous section. **Low quality of public education** further disincentivizes parents from investing in education. In addition, a lot of **parents are lacking primary education** themselves, which makes them more likely to keep their children at home. Households where parents have never attended school are also recognized as **vulnerable targets for traffickers**, as it is easier to convince parents that their children will be taken to a reputable international boarding school.

OBSTACLES: EMERGENCY PHASE

When Nepal gets hit by the next earthquake, the nation will fall back into an emergency state. Naturally, the first priority becomes survival and acquiring basic supplies, but the emergency state doesn't end after the first 72 hours. Many families will be sleeping outside in tents, regardless of whether their house was destroyed or not. Many communities will not have access to clean drinking water or a kitchen to prepare their meals. At this time **education is certainly a luxury**, as children can help clear the rubble from their houses, build temporary shelter, and acquire supplies. Amid the ensuing chaos, **parents lack the ability to bring their children to school**, and thus keeping them at **home is the safest alternative**. As described earlier, this is also when children are **the most vulnerable to human trafficking**. Even in cases where a family's property did not suffer severe damage, **public schools are often damaged or destroyed**, leaving children without a place to study until makeshift classrooms, often called Temporary Learning Centres (TLCs), are built.

OBSTACLES: RECOVERY PHASE

In the recovery phase, children are facing a combination of obstacles from the two previous phases. **Financial burden of education** is likely to become a lot more severe as families focus on reconstruction. With financial hardships more people are likely to sell their children into **trafficking**, even if unknowingly. Without the adequate support from the government, many families will slip further into poverty. They are unable to see that taking their children out of school will further perpetuate the cycle and remove any prospect of rising out of poverty.

GENERAL RESPONSE

Having outlined the obstacles to consistent school attendance, an overall strategy was developed to address each challenge. General response can be divided into four main themes: education, community engagement, emergency response and child safety. These are further programmatically subdivided into seven categories in the design: learn, gather, play, wash, recover, communicate and sleep. Each category is comprised of several components responding to either a specific activity or a user group (for example, *learn* category can address learning for kids or adults). These categories guided the development and organization of specific program in the proposal. From there, a list of spatial requirements was developed that would support the programmatic requirements of the facility. This final step generated the mandatory program for the facility, which includes classrooms, workshops, playgrounds, library, offices, gym, Water Sanitation Hygiene (WASH) facilities, childcare, computer lab, courtyards / market space, and emergency resource storage.

These categories and programs vary between the three phases of recovery, as community's priorities gradually shift from emergency to reconstruction. Thus, the program was developed based on humanitarian response guidebooks (which address the emergency component of the proposal), community disaster response and resilience building literature (which look at the transition into recovery and rebuilding phases), my personal experience from working in Nepal, as well as interviews conducted with the NGO staff on my site visit. The aim was to develop a solution that would have the flexibility to accommodate the varying needs of the community in every phase of recovery.

In order to understand the relationship between each program category and the potential overlap in their functioning, I mapped the intensity of use / activation of each category and program in each of the phases. These maps informed the spatial requirements for each program relative to each other, as well as within the context of the site. For example, they showed which spaces are able to perform multiple functions and thus need to be easily transformable, which spaces require higher degree of privacy or security, and which can remain unprogrammed.

The following sections introduce the site and describe how the proposed program addresses each of the obstacles in greater detail.

A. GENERAL RESPONSE THEMES

B. PROGRAMMATIC CATEGORIES

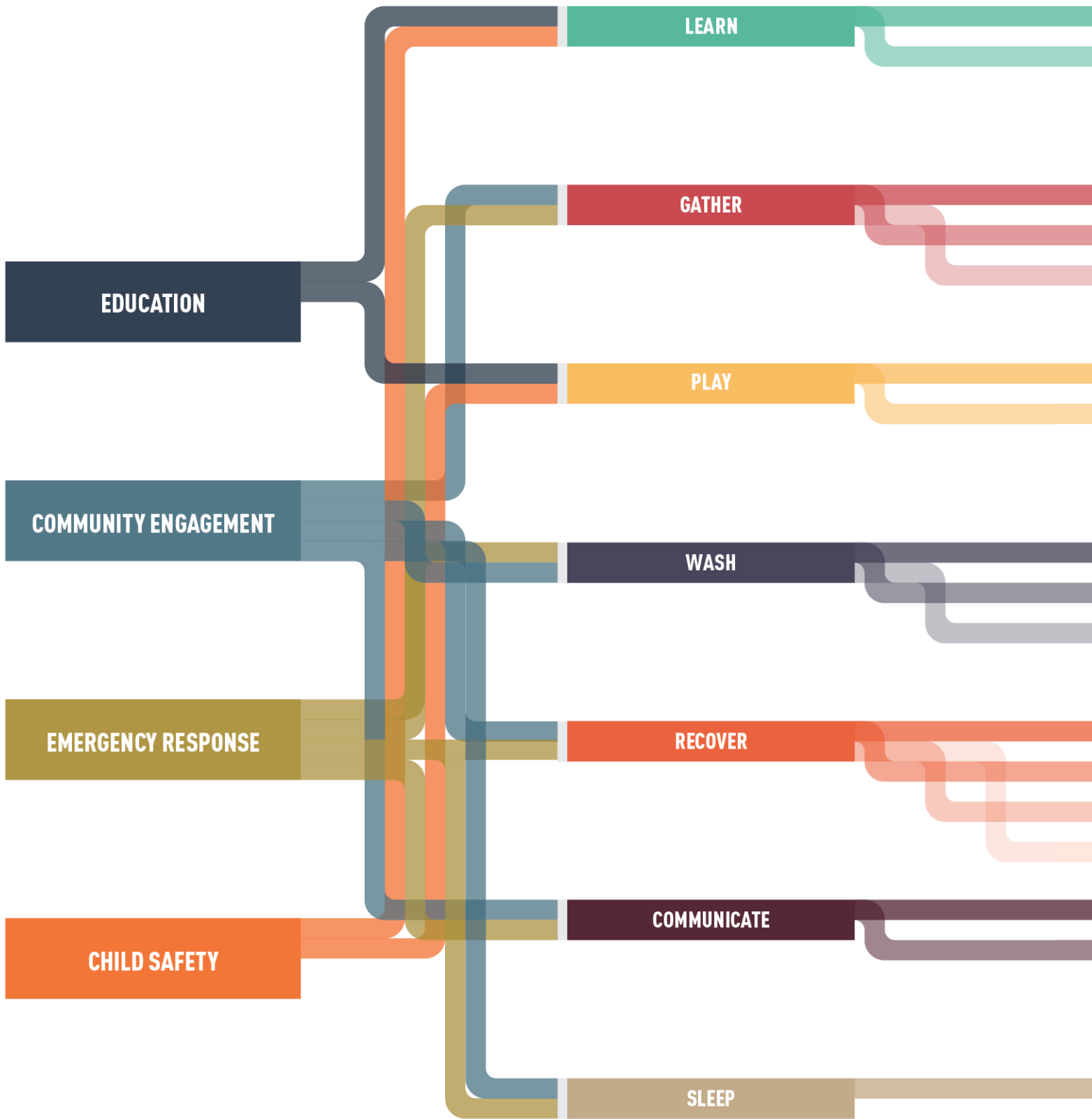
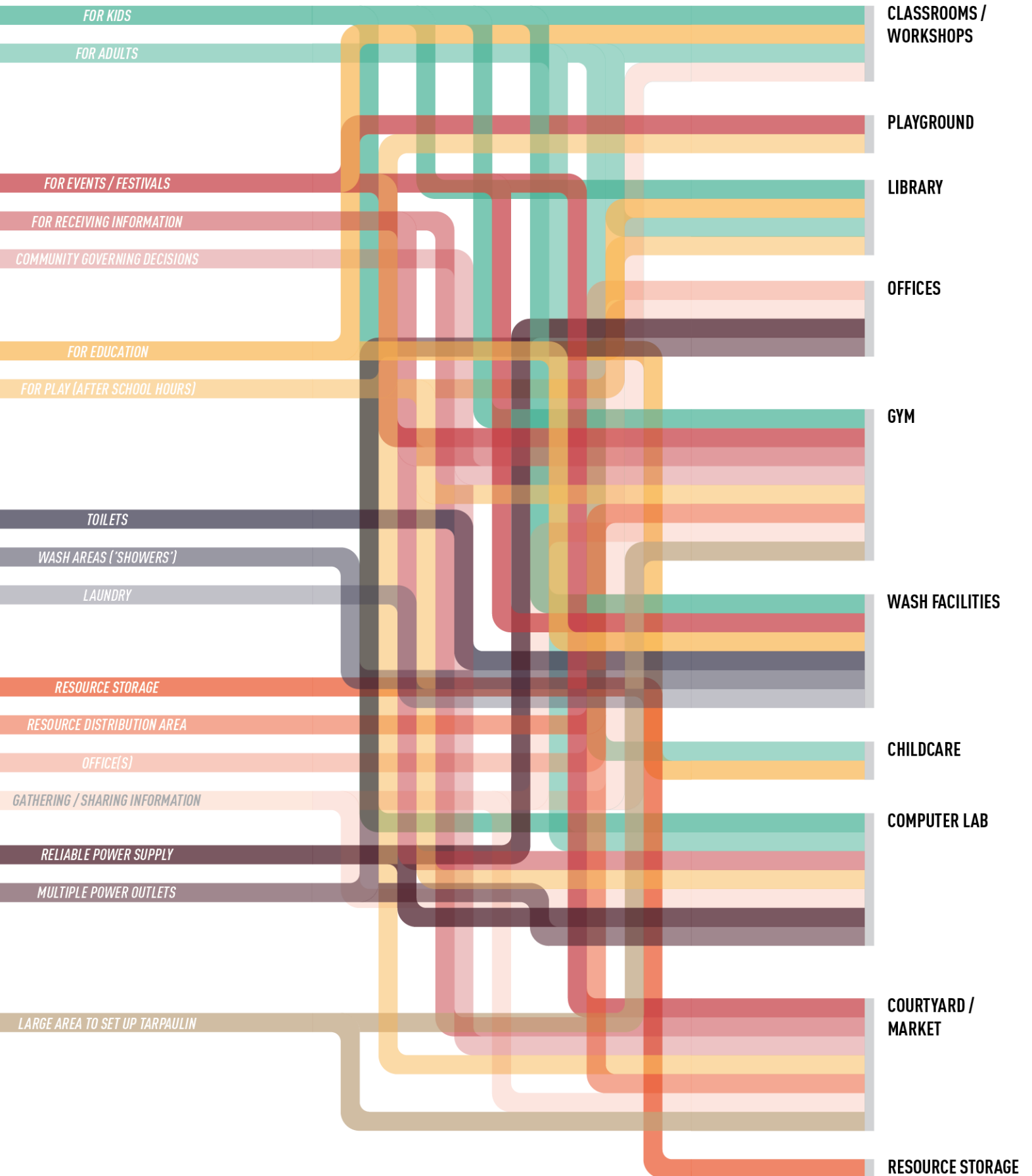


fig. 3.01 Program development diagram

C. CONSTITUENTS OF PROGRAM

D. SPATIAL CATEGORIES



STABLE

LEARN

TRAIN

PLAY

WASH

SLEEP

RECOVER

COMMUNICATE

GATHER

accommodate schools
and public program

no IDP camp requirement

peaks = disaster preparedness
workshops / training

peaks = cultural
events / fes

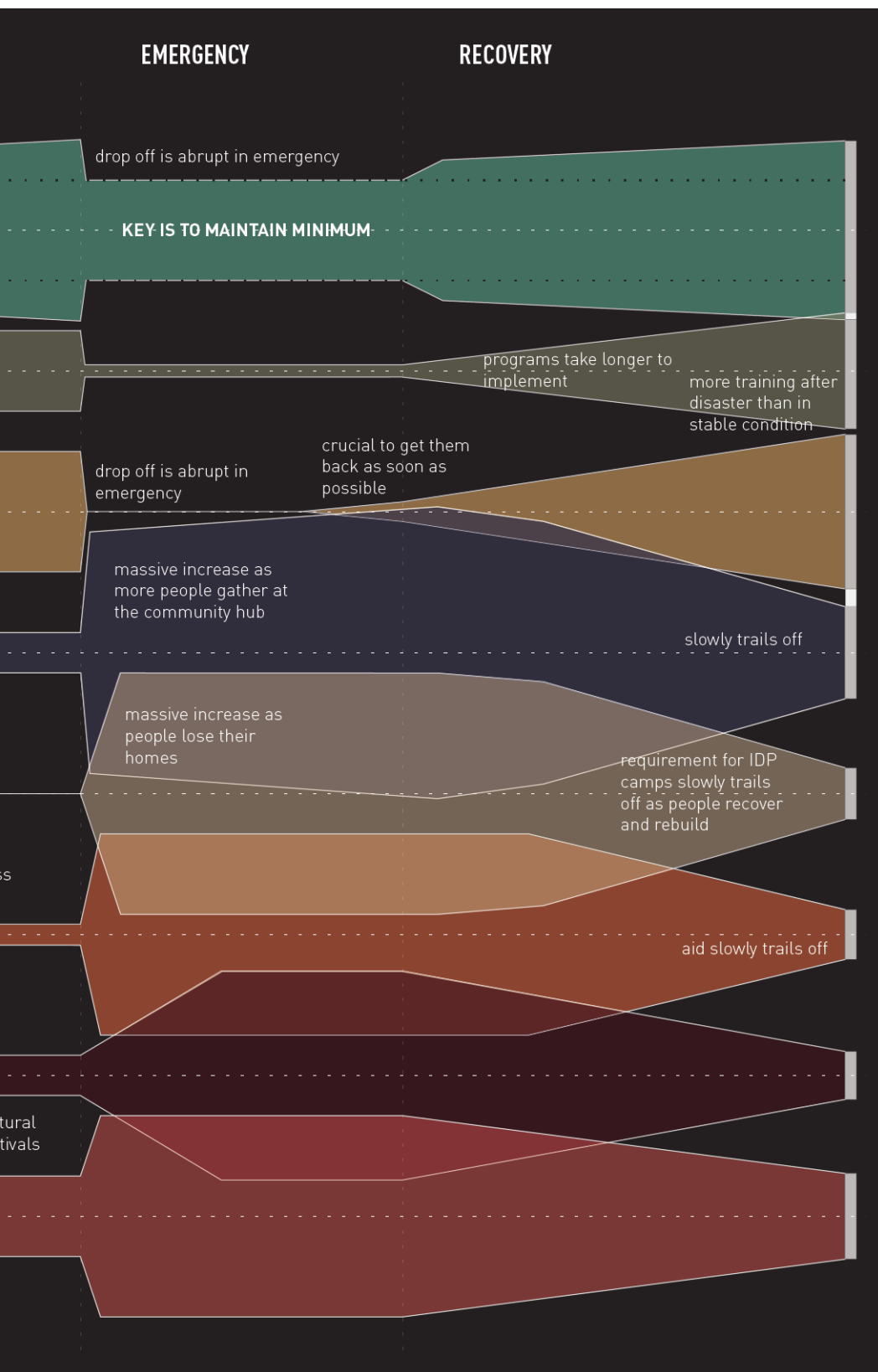
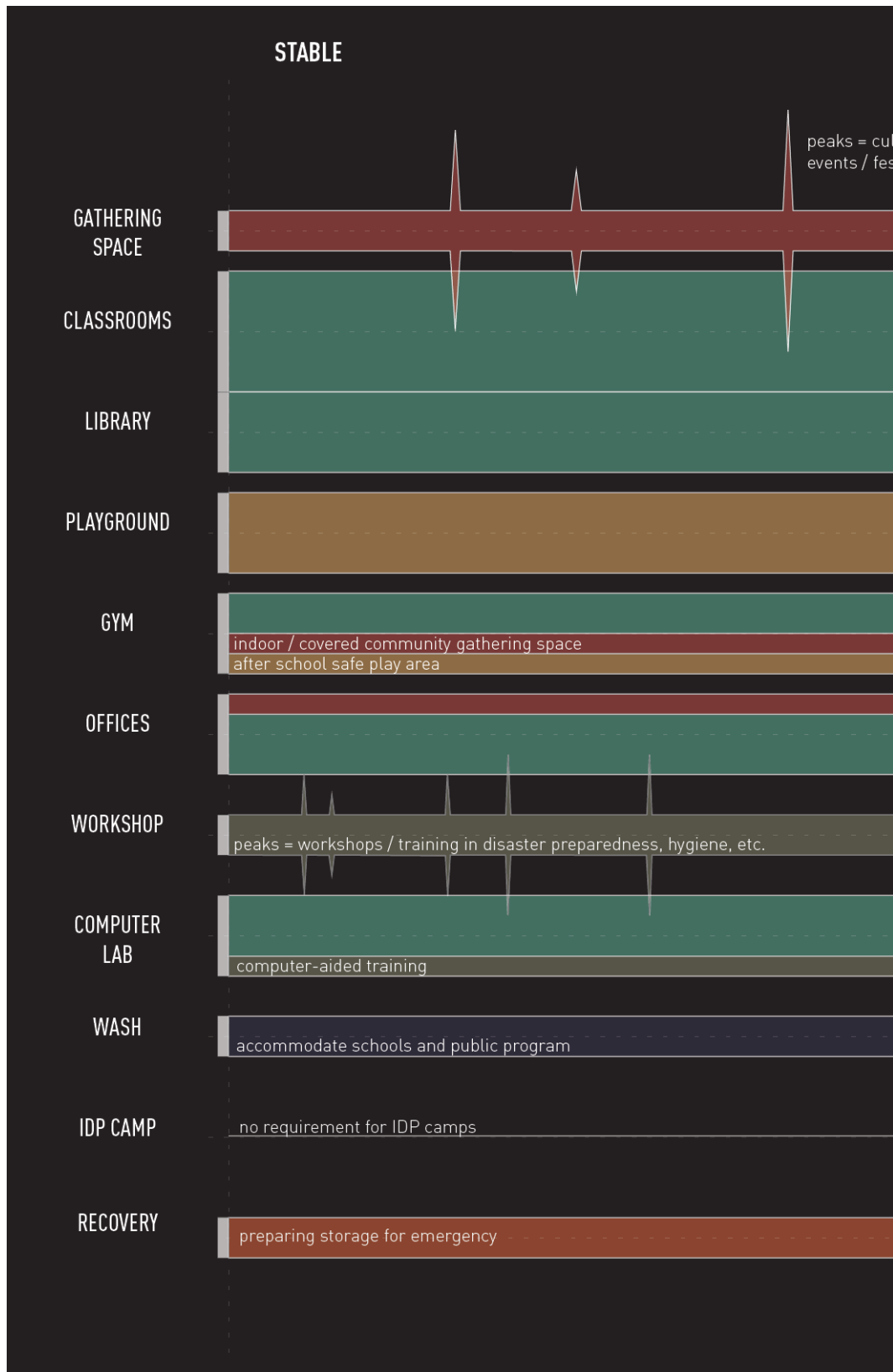


fig. 3.02 Map of temporal intensity of use of each programmatic category; reveals which program will require to grow in order to accommodate an increasing number of users through different phases.



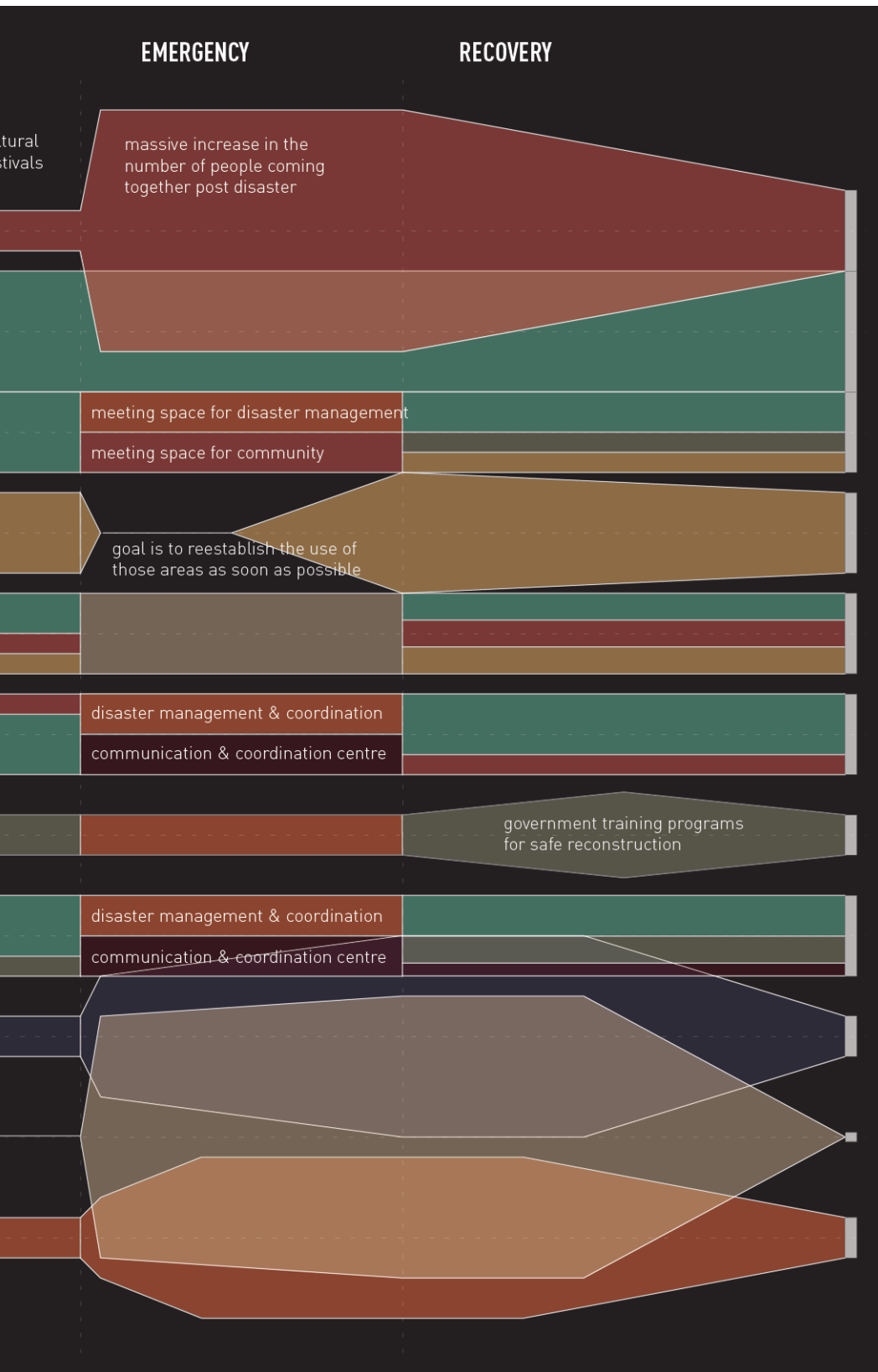
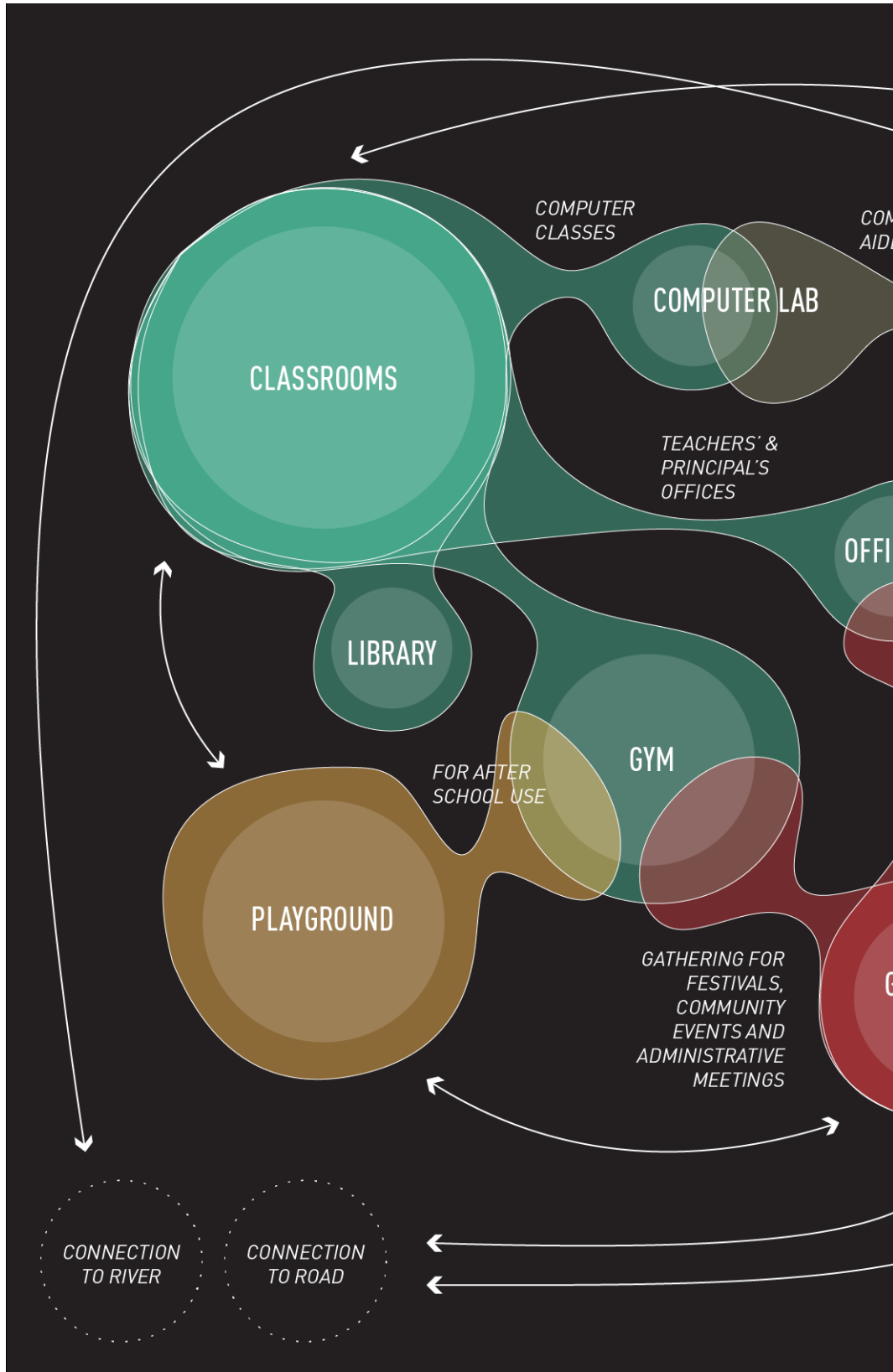


fig. 3.03 Map of temporal intensity of use of individual program components; reveals which spaces will require to grow in order to accommodate an increasing number of users through different phases.



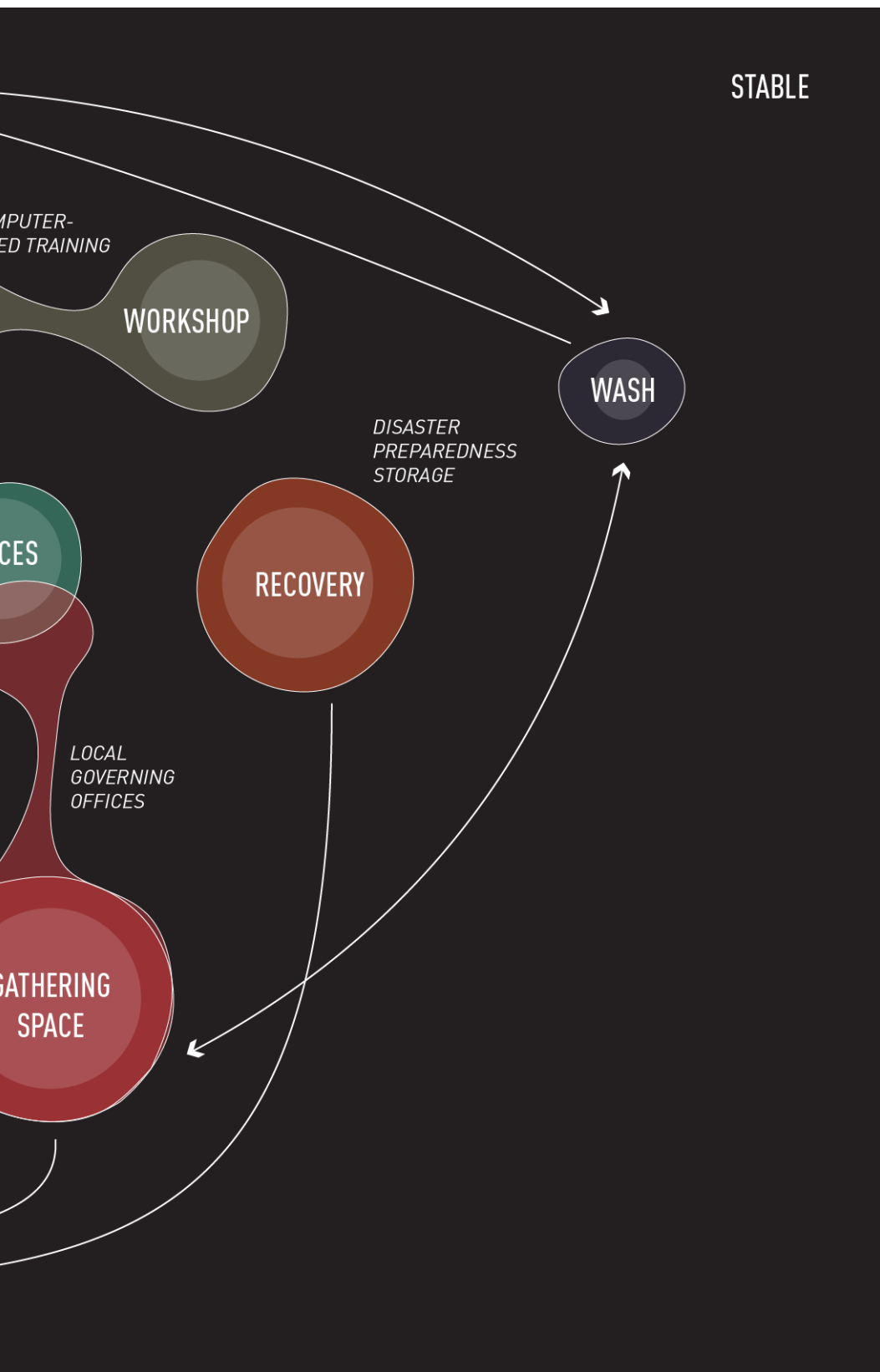
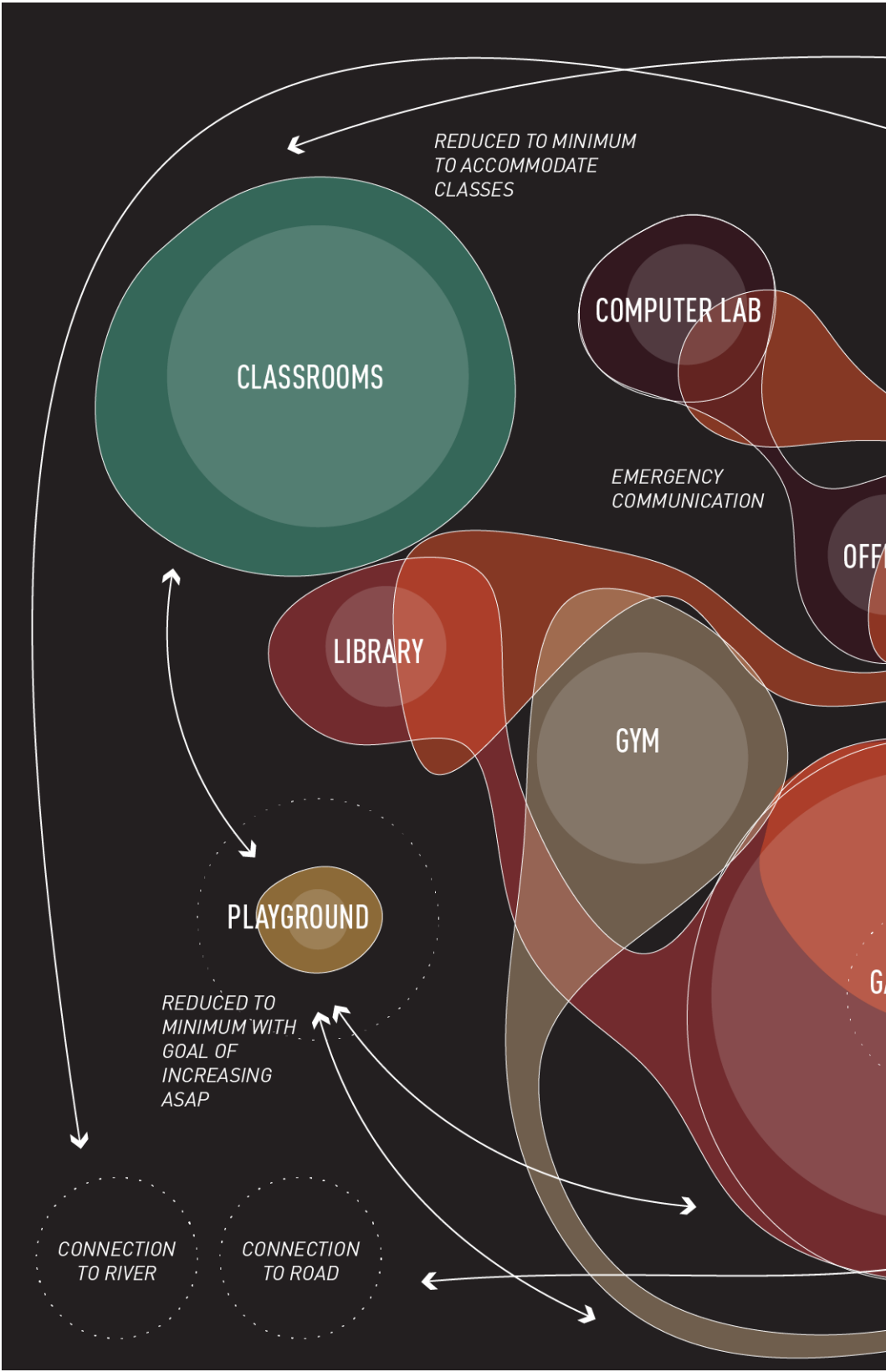


fig. 3.04 Exploring the relationship between the proposed program, the site and spatial overlaps in the stable phase of recovery.



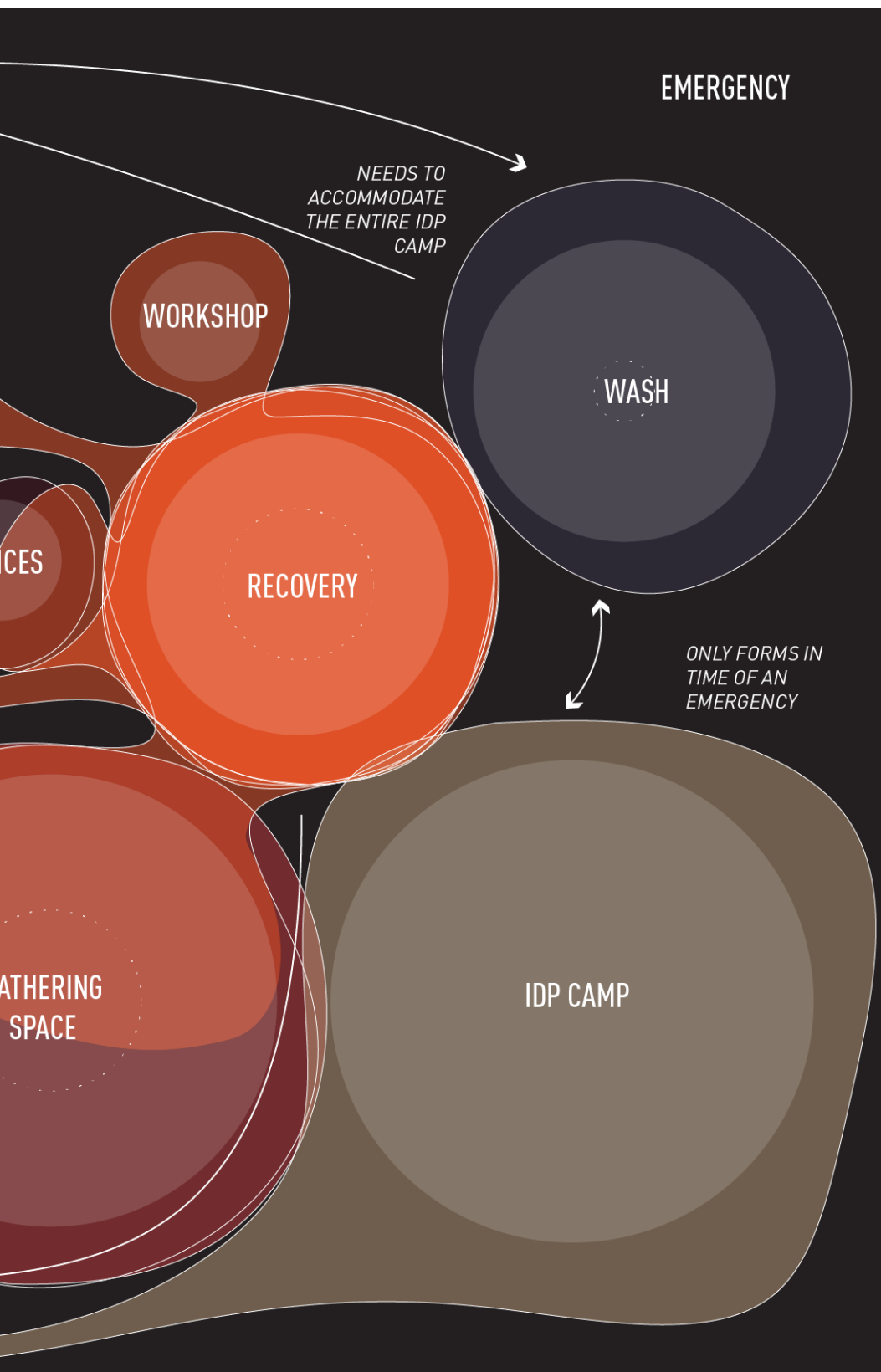
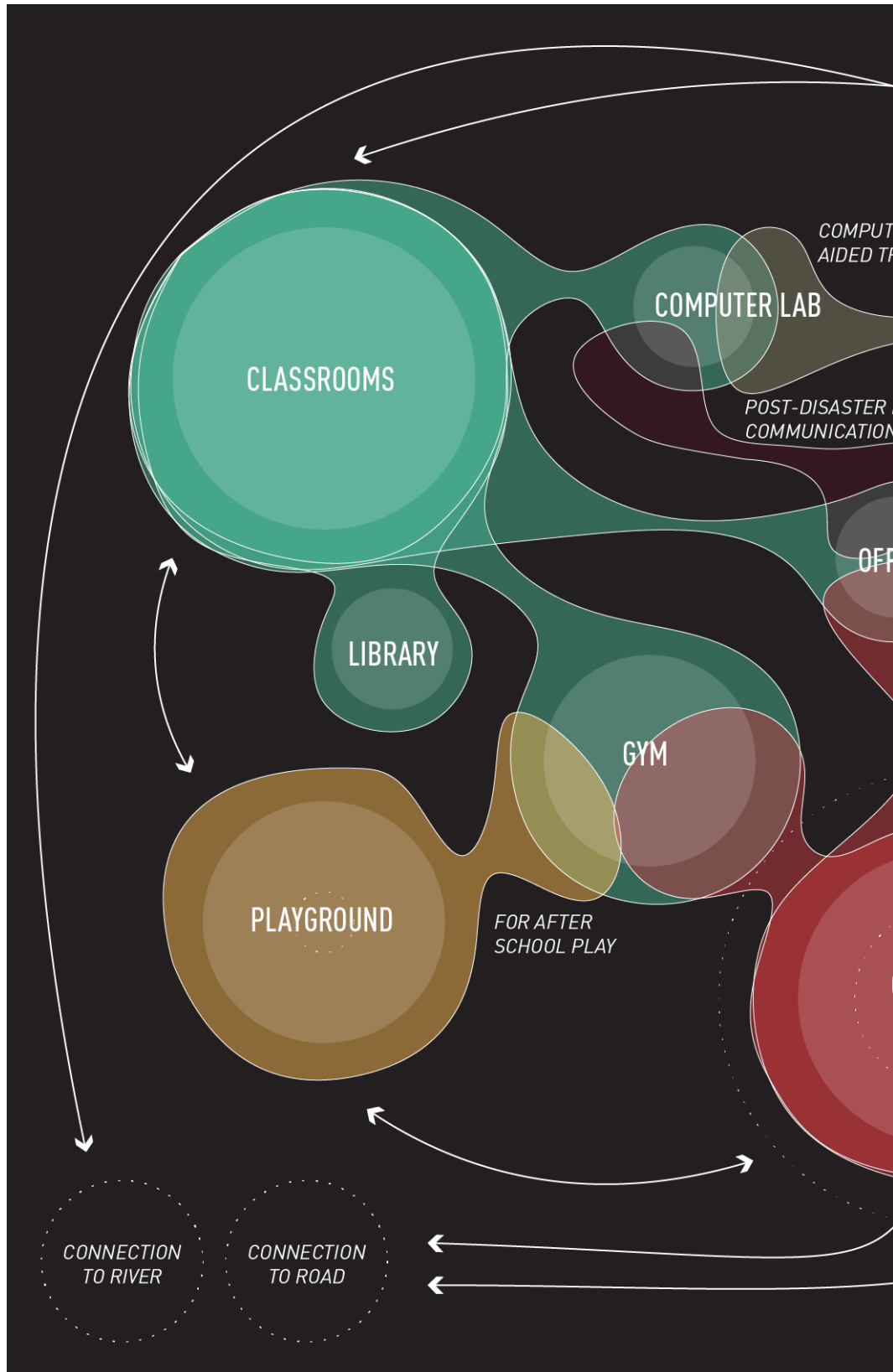


fig. 3.05 Exploring the relationship between the proposed program, the site and spatial overlaps in the emergency phase of recovery.



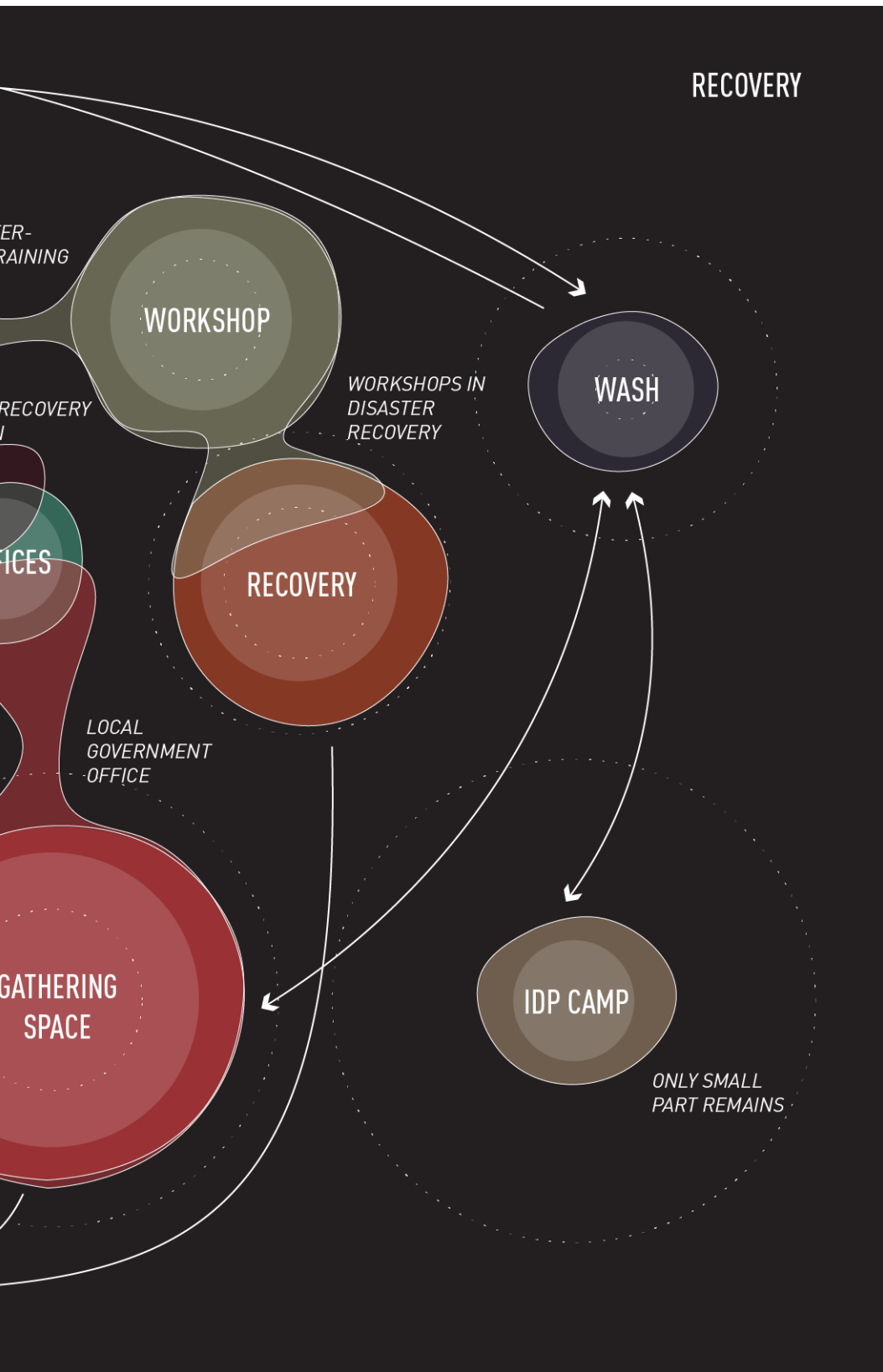
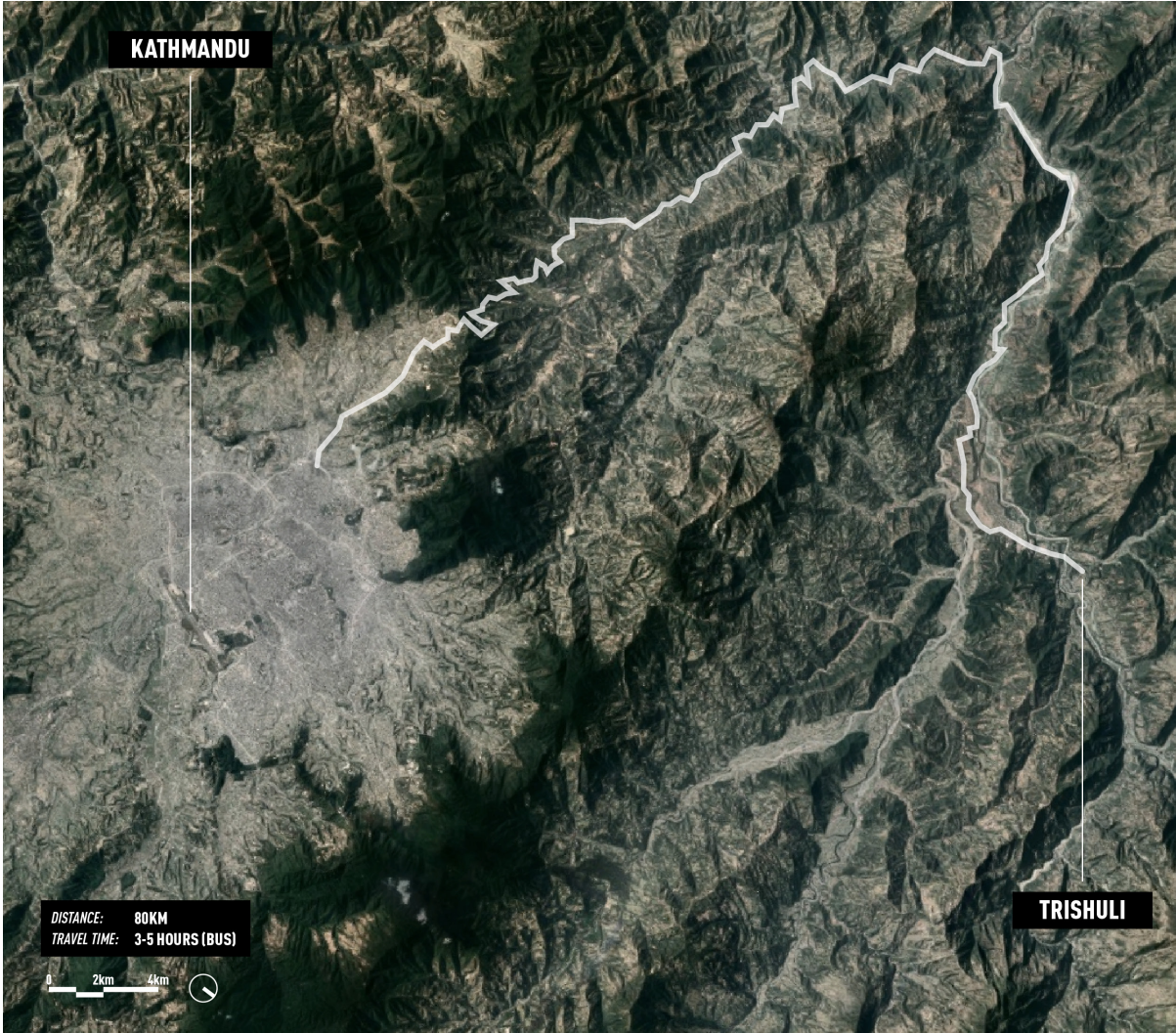


fig. 3.06 Exploring the relationship between the proposed program, the site and spatial overlaps in the recovery phase.



CHAPTER 3.2

INTRODUCTION TO SITE

The site for the proposal acts as a test ground for the thesis question and the developed program. It is surrounded by four existing public schools, and so the focus of the proposal is on how to promote children's consistent attendance to the education facilities already present in the community.

The site is located in the semi-rural town of Trishuli, roughly 80km northwest from Kathmandu, lying in a valley at about 550m above sea level. Numerous remote rural villages are dispersed along the foothills that are surrounding the valley. Like a typical *sadarmukam*, Trishuli is connected to the capital by a highway. It has a hydroelectric power station, several health care facilities, several public and private schools, government offices, hotels and banks. Houses become sparser as you move away from the dense urban center, but they are surrounded by larger agricultural plots.

Being a *sadarmukam*, Trishuli is the primary source for surrounding rural settlements for buying supplies, obtaining healthcare, getting to a bank, connecting to a local government official, getting public transport to the capital and so on. This allows the proposal to benefit a greater number of people, as many will visit Trishuli on regular basis from surrounding villages. This becomes especially critical immediately after a disaster, as people from remote communities will come to a *sadarmukam* for emergency supplies, which first get delivered to Kathmandu and then distributed to *sadarmukams* across the affected regions.¹

I became familiar with Trishuli during my first visit to Nepal, as one of the school construction sites was located a ten minute drive from the city center and all volunteers lived in a residential base right on the edge of town. I revisited the region on my second trip the following year to study the proposal site more thoroughly.

fig. 3.07 (opposite page)
Travel route from
Kathmandu to Trishuli. A
mere 80km can take up to
5h to travel on a public bus

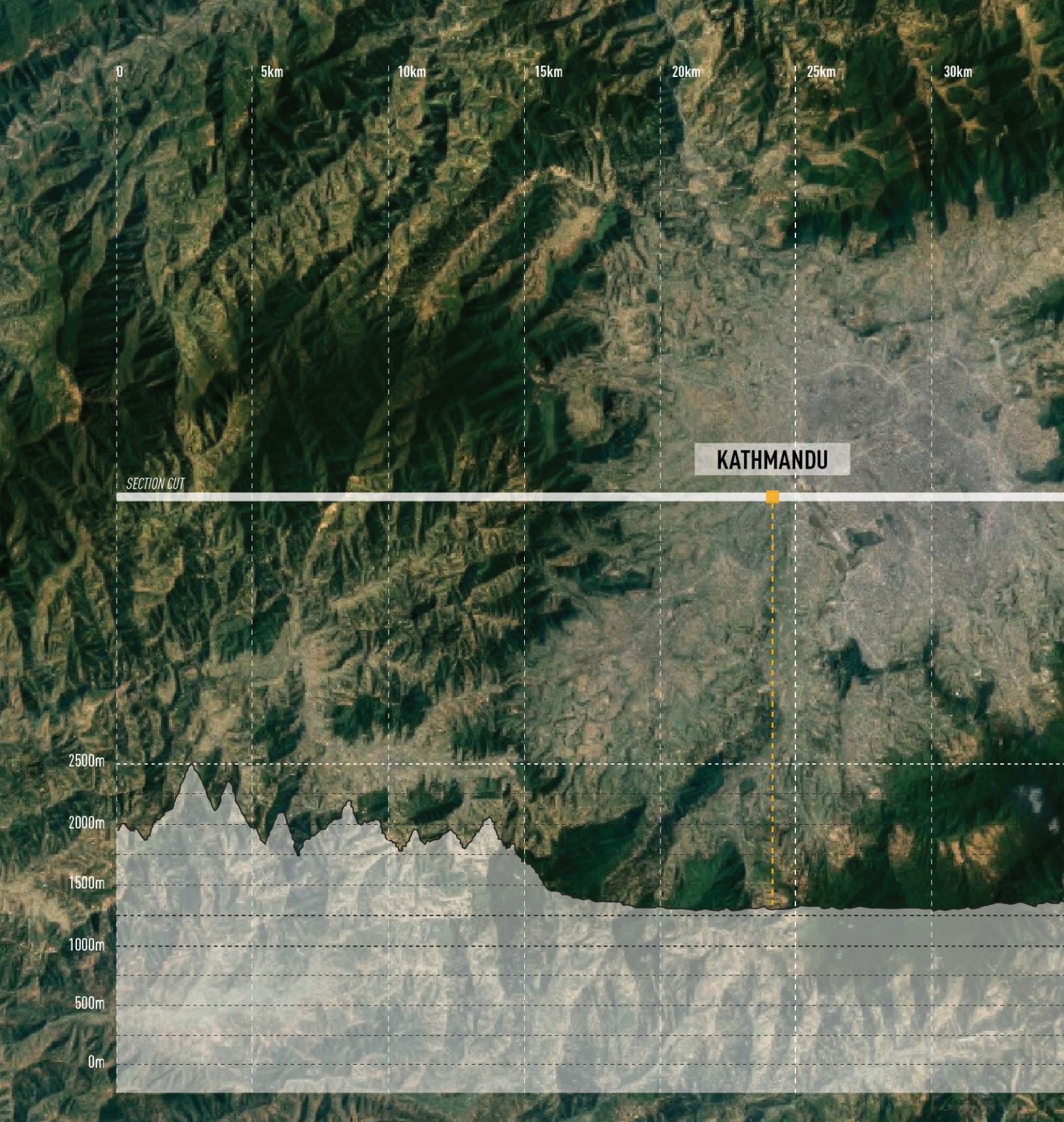


fig. 3.08 Sectional relationship between Kathmandu and Trishuli. Kathmandu is located in a valley at about 1,300m, while Trishuli lies at roughly 550m, but within a much more complex terrain. This makes access to Trishuli and surrounding areas especially challenging during monsoon seasons, as many rural roads get blocked by landslides.



TRISHULI



fig. 3.09 Aerial view of Trishuli and surrounding settlements



PROPOSAL SITE

HIGHWAY TO KATHMANDU



fig. 3.10 Site plan of Trishuli. The selected site is a vacant soccer field, with four school facilities bounding it on the north and south edges, and Trishuli river running on the east. It is centrally located between three distinct zones in the area- a dense city center on the southwest side, residential neighbourhood on the west, and an industrial, mostly uninhabited area up north. The northern edge also contains a pedestrian bridge, which becomes a connecting point to the residential regions across the river. While adjacency to the river is usually considered a favourable feature, strong current and lack of sandy shores doesn't allow for much interaction with it.

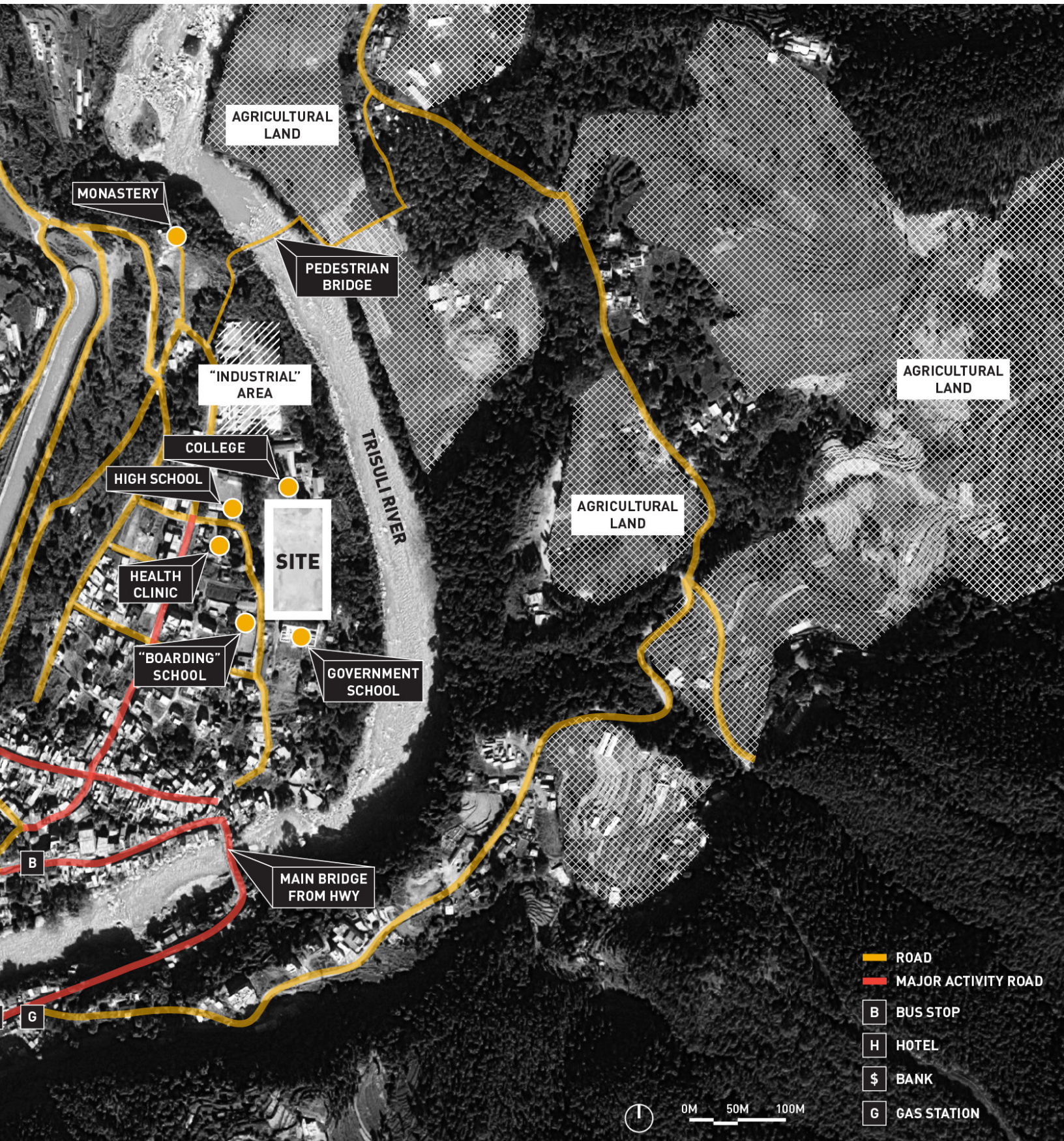
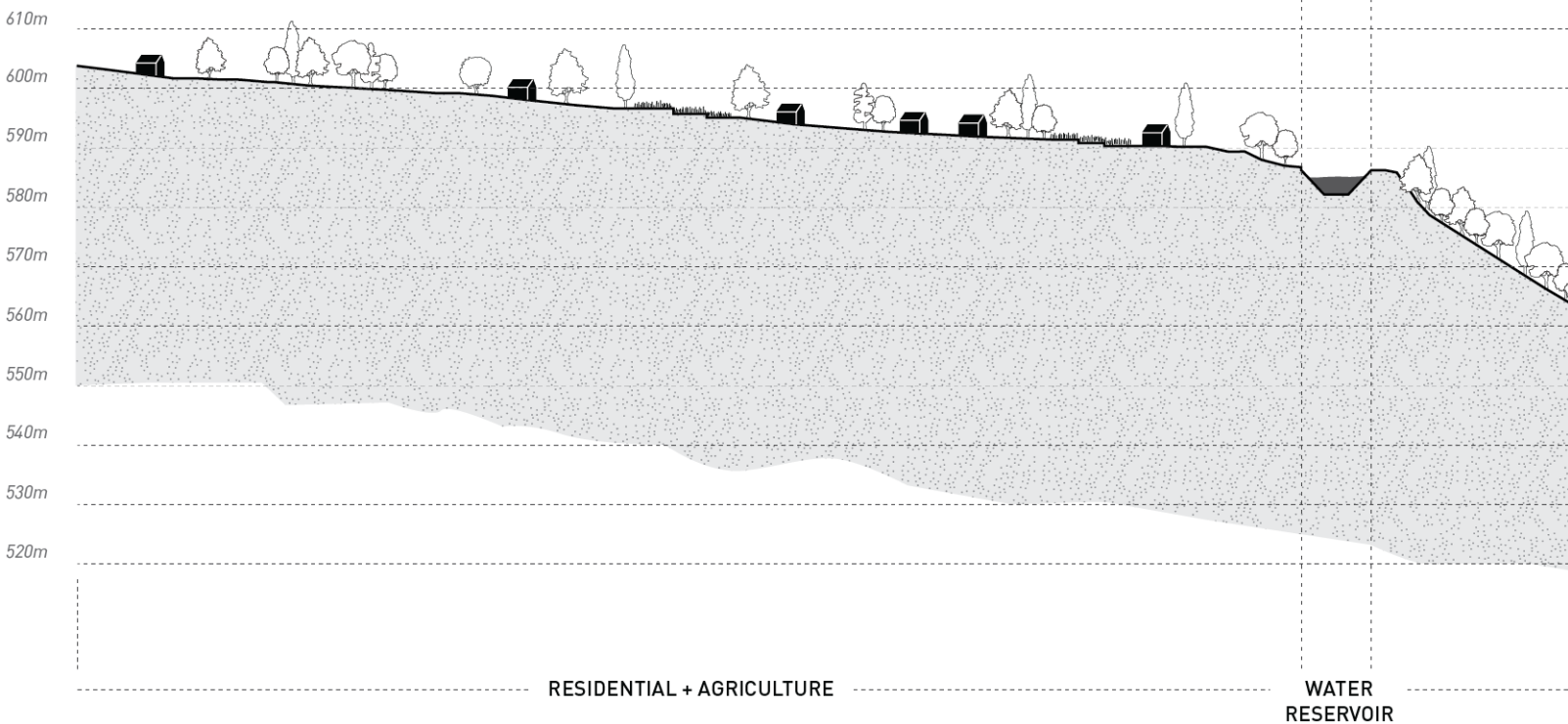


fig. 3.11 Overall site section in relation to the surrounding landscape. Selected site is located at the base of a hill, adjacent to the river. Surrounding neighbourhoods are primarily residential areas, where majority of the land has been clear-cut for agricultural production. This results in a possibility of flooding during heavy monsoon rains, which is addressed in the proposal through water management strategies (see pages 168-170).

SECTION CUT



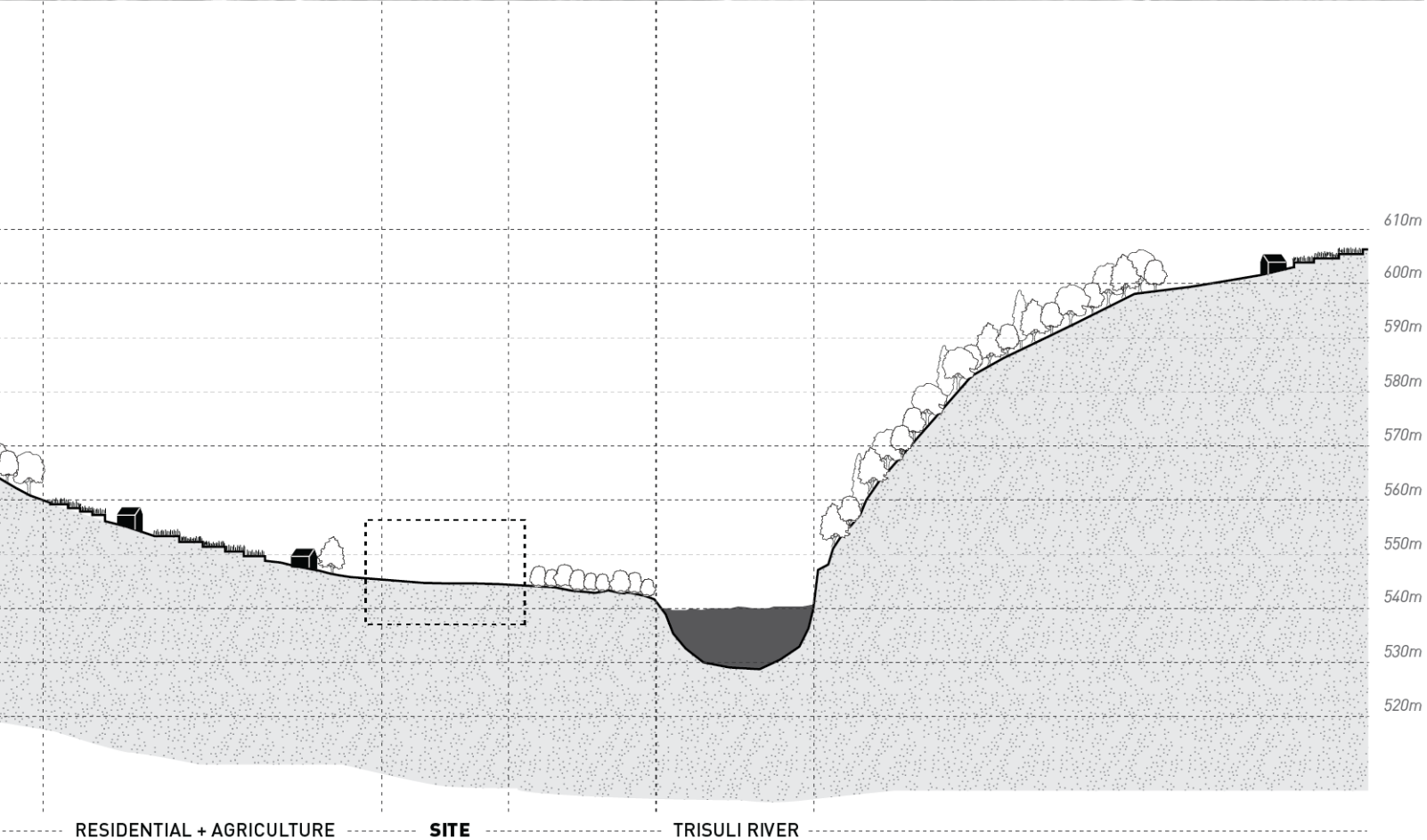
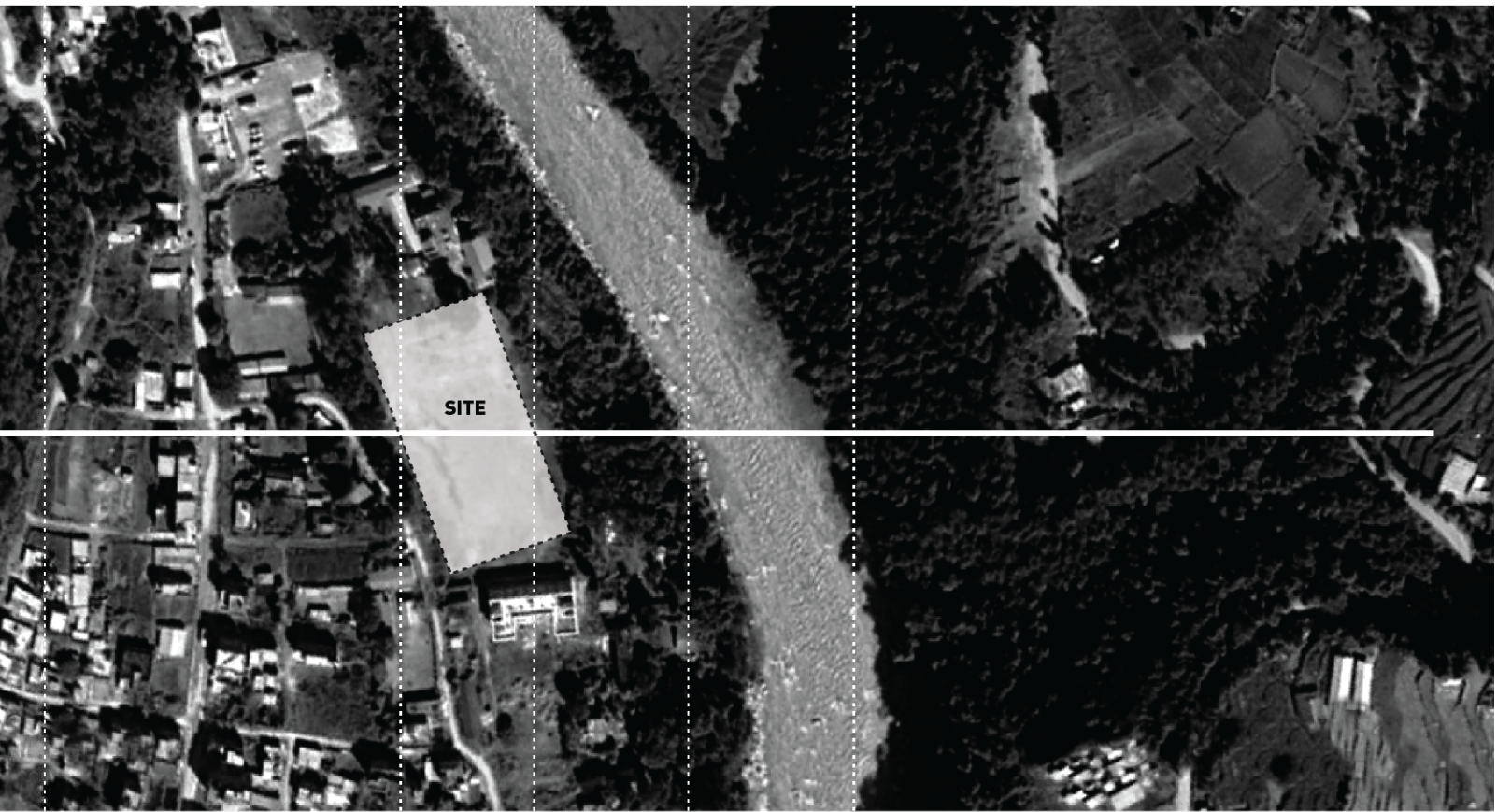




fig. 3.12 View of Trishuli from the surrounding hills.



fig. 3.13 Trishuli:
approaching the town from
the bridge, off the main
highway



fig. 3.14 Trishuli: a
commercial street in the
city centre





fig. 3.15 Trishuli: residential areas on the west side of town; houses are surrounded by large agricultural plots



fig. 3.16 Trishuli: moving away from the city, houses become more sparse with vast plots of agricultural land

fig. 3.17 Proposal site:
college and a high school
on the north side of the
soccer field



fig. 3.18 Proposal site:
looking northeast towards
the college and the adjacent
river





fig. 3.19 Proposal site: looking south towards the government school (under construction at the time of visit in July 2017)



fig. 3.20 Proposal site: main access road running parallel to the soccer field

GENERAL RESPONSE TO SITE

The program is arranged such that it becomes an extension of the existing school facilities, not isolating itself as an island hub but rather bridging the current void. Main site strategy was organizing program into two clusters, with an internal courtyard in each. The angles of the massing are shaped such that they open up to the adjacent schools, providing open space for each. Northern portion is geared towards higher education students and contains the library, computer lab, workshop / lecture space and gym, along with woman's workshop and childcare. It is more secluded, quieter and has a slower pace of movement through it, as people tend to spend more time in those spaces. The lower wing has programs that are more community-oriented. It contains the market spaces, open gathering area, resource storage, outdoor wash area and washrooms, as well as the men's workshop. The gap between two courtyards is consolidated by a large community *chautara*, a resting and meeting place for the community. Underneath it is an array of water taps with potable water supply, which is filtered from rainwater collection tanks. Child play areas wind through the center of both courtyards, in the most visible and thus safest location on site.

The following section looks at how the program responds to specific obstacles to school attendance in the three different phases of recovery.

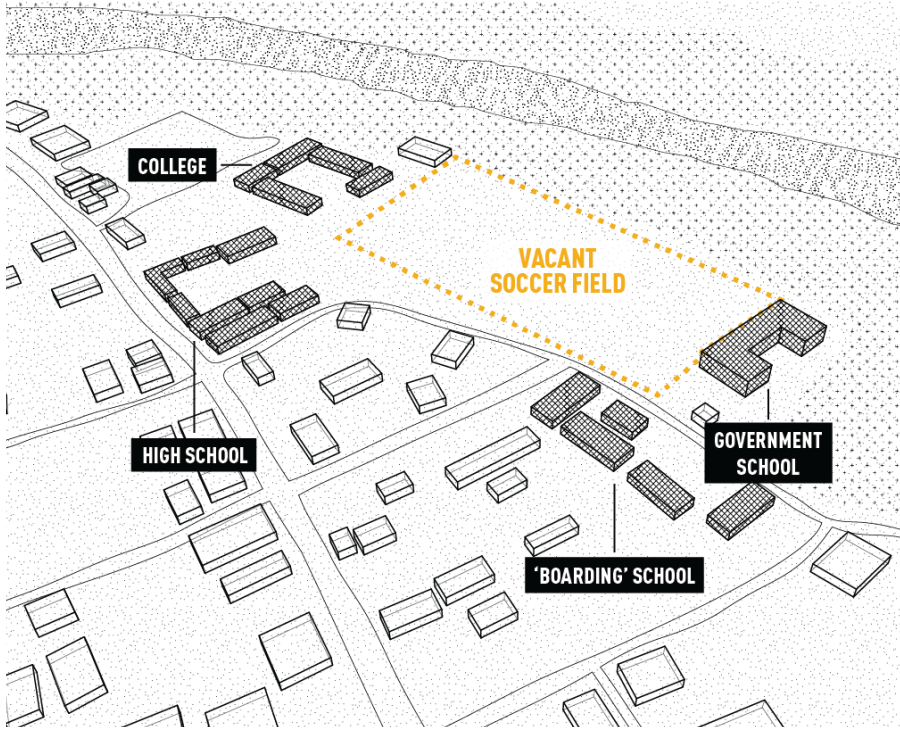


fig. 3.21 Site is located on a vacant soccer field, embedded between four existing school facilities.

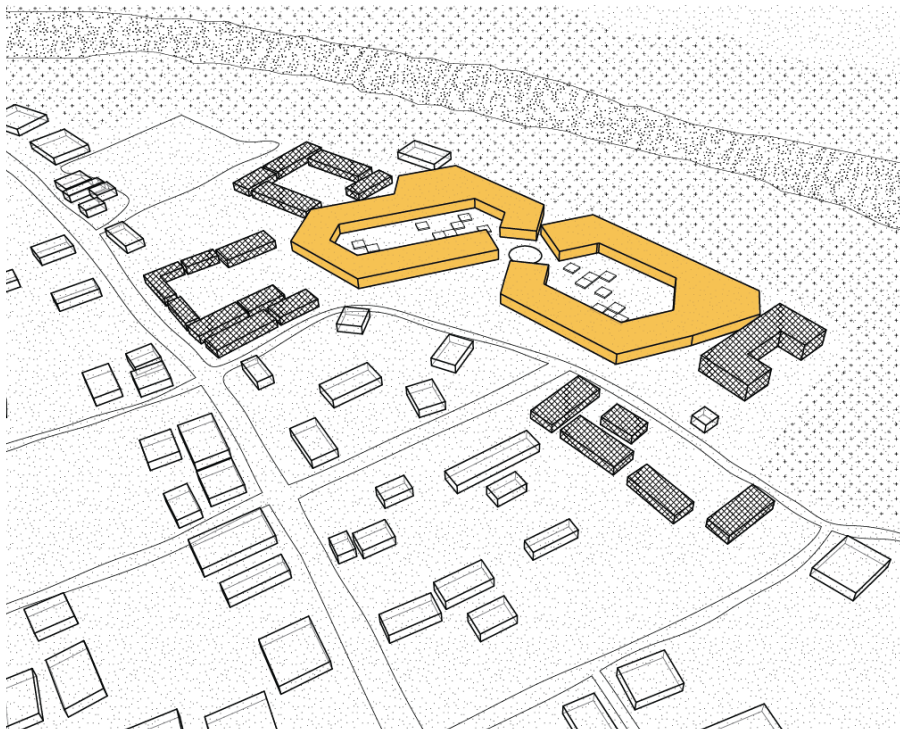


fig. 3.22 Main site strategy was organizing program into two clusters, with an internal courtyard in each.

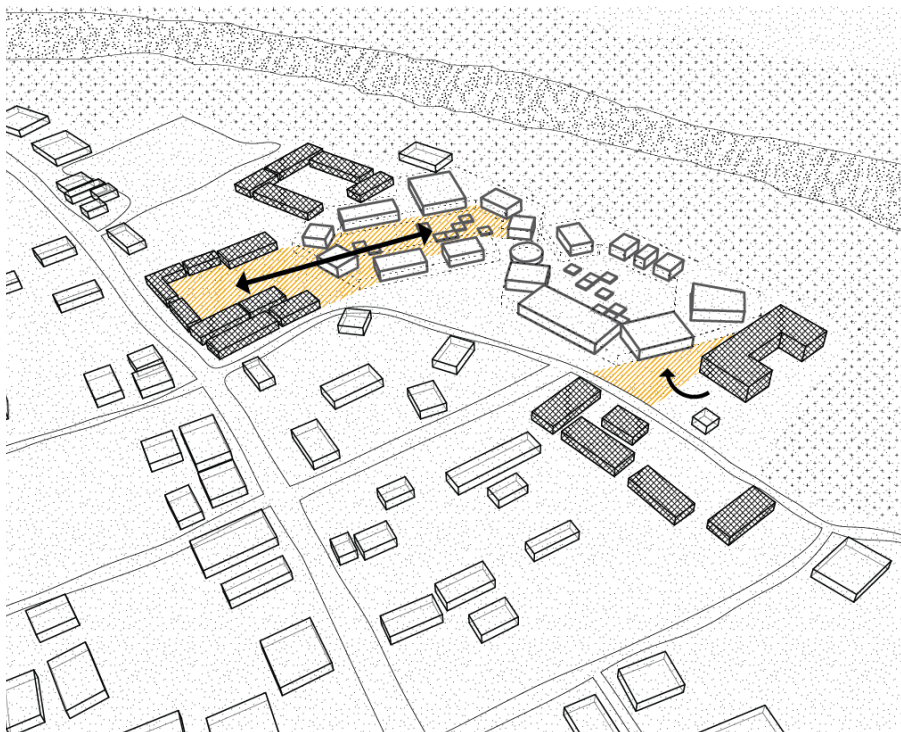


fig. 3.23 The angles of the massing are shaped such that they open up to the adjacent schools, providing open space for each.

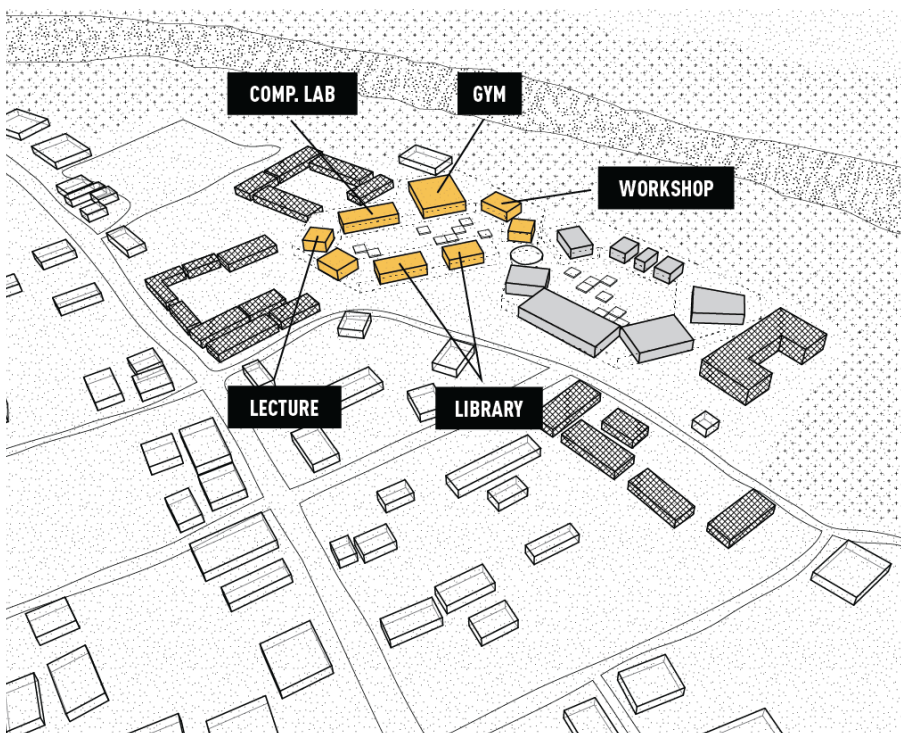


fig. 3.24 Northern portion is geared towards higher education students and contains the library, computer lab, workshop/lecture space and gym, along with woman's workshop and childcare. It is more secluded, quieter and has a slower pace of movement through it, as people tend to spend more time in those spaces.

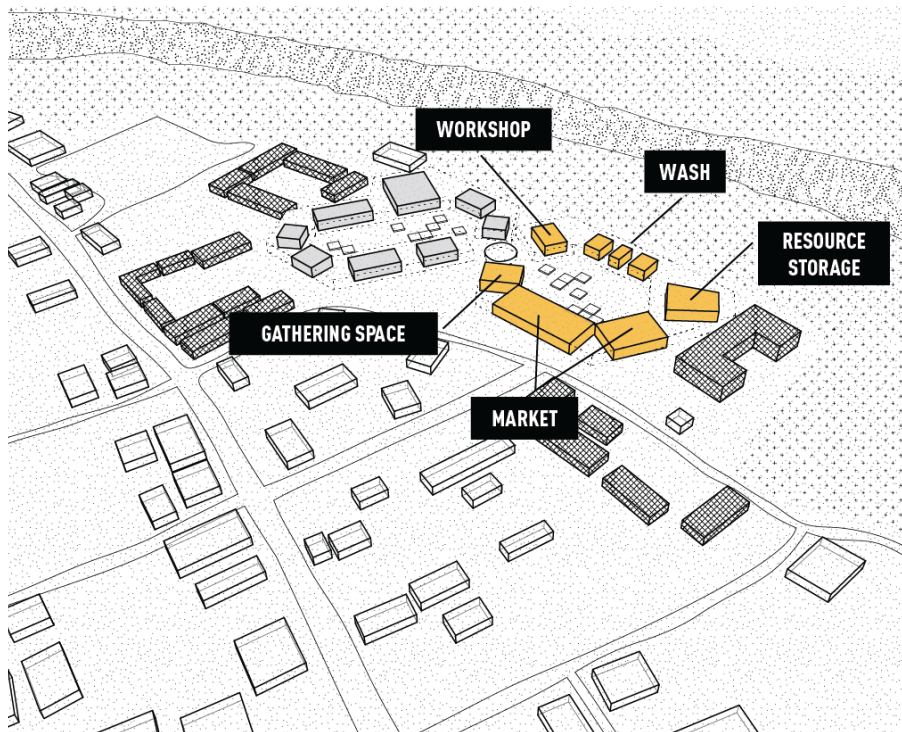


fig. 3.25 The lower wing has programs that are more community-oriented. It contains the market spaces, open gathering area, resource storage, outdoor wash area and washrooms, as well as the men's workshop.

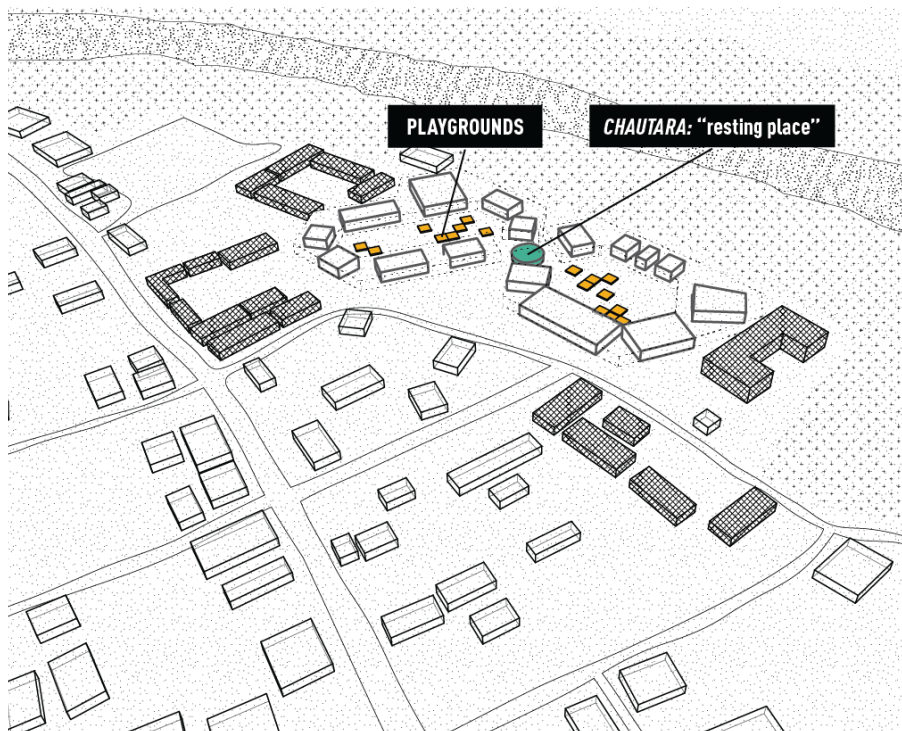


fig. 3.26 The gap between two courtyards is consolidated by a large community chautara, a resting and meeting place for the community. Underneath it is an array of water taps with potable water supply, which is filtered from rainwater collection tanks. Child play areas wind through the center of both courtyards, in the most visible and thus safest location on site.

CHAPTER 3.3

ADDRESSING THE OBSTACLES

Although the obstacles to education are clearly outlined in the previous chapters, the proposal cannot address any of the above-mentioned obstacles with any degree of certainty, nor is it designed to do so. Challenges to education vary greatly between different communities, individual families and circumstances of recovery. It is outside the reach of this thesis to propose a solution to alleviate those challenges, as the solution is impossible to design or legislate. This proposal is merely suggesting strategies that would encourage, incentivize and facilitate children's attendance and strengthen community's social network, with the hope of increasing the likelihood of kids receiving an education. The program is designed to provide conditions that would encourage the community to see value in education. Increase in school attendance would be an indirect consequence of that. *Thus the proposal can be seen merely as an agent for facilitating change.*

The proposed program is based on the common spatial and cultural practices observed during my trips to Nepal, the aim was not to introduce foreign concepts. Even program such as a computer lab is not just an optimistic desire to bring the quality of public education to the Western standard. While computer labs in schools may be rare (especially in rural areas), it is something that communities actively strive to provide. What is new in the proposal is the way in which various programmatic elements get combined and produce a new typology of public space.





STABLE PHASE

One of the biggest objectives of the proposal is to rebuild the image of the school, as the architect Diébédo Francis Kéré put it, as a “place of hope, symbolic of the success of change and the triumph of education.”¹ The aim is to show the value education can bring in the long term, which is specifically addressing the issue of opportunity costs. Since formal education facilities are already in place, the proposal is focused on adding complimentary spaces, such as a computer lab, a library and a gym to improve the quality of educational facilities on site. As there is no public library currently present in the community, it can provide additional resources to the existing schools, as well as be used by children and adults in the community to help improve literacy rates. While gym is meant to be an addition to the school facilities, it also becomes an important safe space for children outside of school hours.

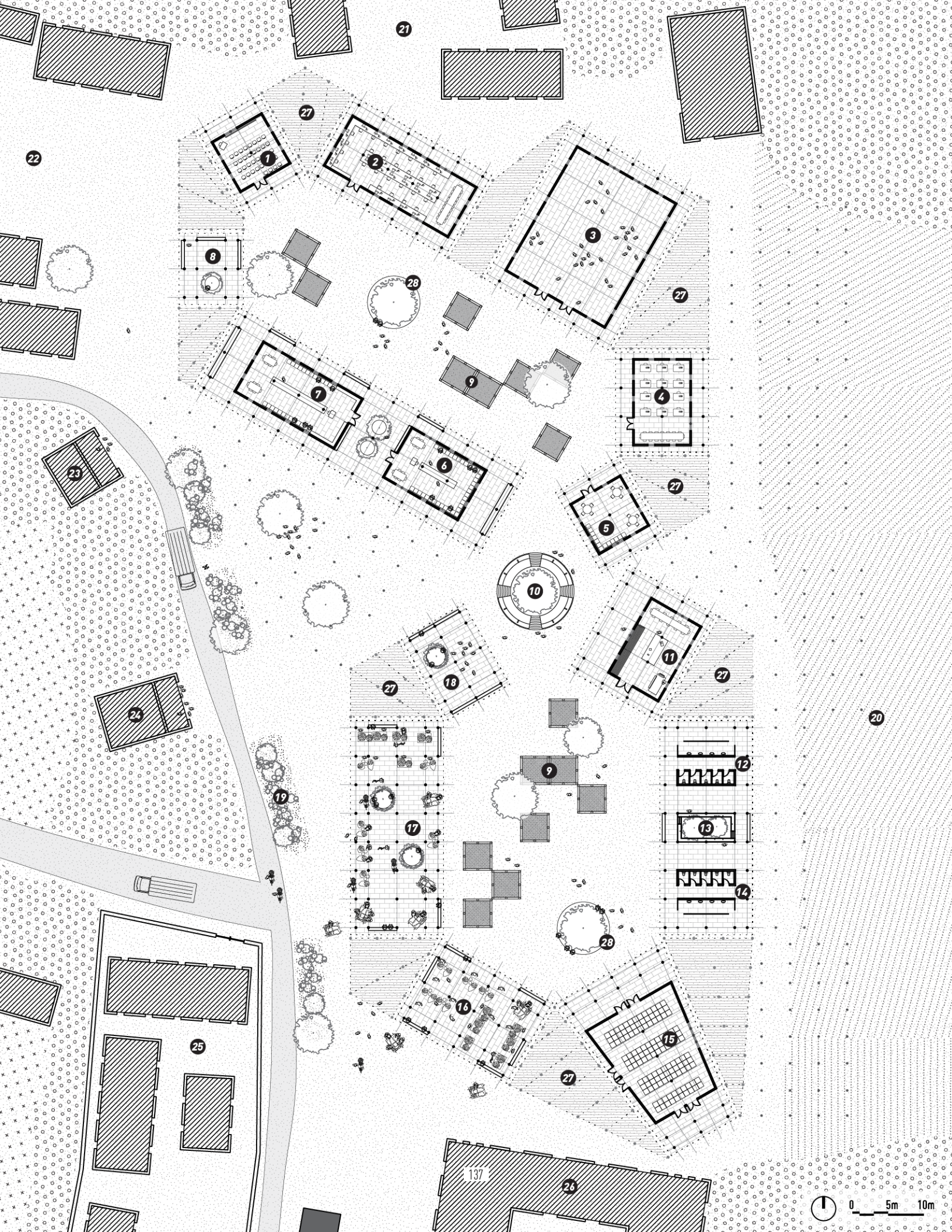
In addition, vocational training will be provided for those who are out of school but want training in order to get a job or start a small business. This could provide more financial freedom to the family in order to send their children to school. Two separate workshops are an important part of the facility. One is specific to women-oriented craft such as sewing, candle / incense making and weaving. Learning practical skills that can be used for starting a business or getting a job could help alleviate some financial burden and reduce reliance on agricultural production for survival. Aside from women who want to complete the training, workshop is open to any member of the community who would like to use the equipment but cannot afford to buy it. This could be beneficial to families that cannot afford to purchase their children’s uniforms and so can use the workshop to sew their own. Child care facility is located adjacent to the women’s workshop to assist women with small children in participating in the training. These spaces can also be used by existing organizations such as the Women’s Group, which hold regular meetings, provide vocational training and give out microloans to assist women with opening their own businesses. Second workshop is geared towards traditionally male trades, such as construction and furniture making.

The addition of an open air market to the program has a similar intent – by providing space where vendors can sell their produce, or men and women can sell the crafts they’ve produced in the workshop, families are able to diversify their sources of revenue and have a more secure income.

The addition of potable water taps and outdoor wash area is aimed at bringing

the community together on daily basis for common, daily tasks such as collecting water and washing clothes. As women are typically the ones responsible for fetching water and washing clothes in a household, bringing those daily tasks to where the schools are makes education an active part of community's daily life. This can affectively combine two separate tasks in a women's daily routine-bringing children to school and taking care of house chores. The facility also provides flexible gathering spaces through numerous chautaras and outdoor trellis-covered areas that can be used on daily basis, as well as larger gatherings such as festivals and celebrations. These help strengthen the social network and sense of belonging to the community.

fig. 3.27 (previous page)
Perspective view from
the northern courtyard,
looking towards the
chautara



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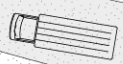
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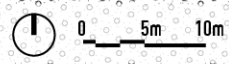
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STABLE PHASE

- | | | | |
|-----------|---------------------------------|-----------|--|
| 1 | COMPUTER LAB WORKSHOP | 16 | COVERED MARKET AREA |
| 2 | COMPUTER LAB | 17 | COVERED MARKET AREA |
| 3 | GYM | 18 | COVERED OUTDOOR GATHERING AREA |
| 4 | FEMALE CRAFTS ORIENTED WORKSHOP | 19 | BIOSWALES |
| 5 | CHILD CARE | 20 | BAMBOO CULTIVATION AREA |
| 6 | LIBRARY, CHILDREN WING | 21 | COLLEGE (EXISTING) |
| 7 | LIBRARY, ADULT WING | 22 | HIGH SCHOOL (EXISTING) |
| 8 | OUTDOOR READING AREA | 23 | SHOP (EXISTING) |
| 9 | CHILDREN PLAY AREA | 24 | STATIONERY SHOP (EXISTING) |
| 10 | CHAUTARA & POTABLE WATER TAPS | 25 | "BOARDING" SCHOOL |
| 11 | MALE CRAFTS ORIENTED WORKSHOP | 26 | GOVERNMENT SCHOOL (UNDER CONSTRUCTION) |
| 12 | FEMALE WASHROOM | 27 | OUTDOOR TRELLIS-COVERED PUBLIC SPACE |
| 13 | OUTDOOR WASH AREA | 28 | CHAUTARA |
| 14 | MALE WASHROOM | | |
| 15 | EMERGENCY RESOURCE STORAGE | | |

fig. 3.28 Floor plan: stable phase

HIGH SCHOOL

WORKSHOP / LECTURE

COMPUTER LAB

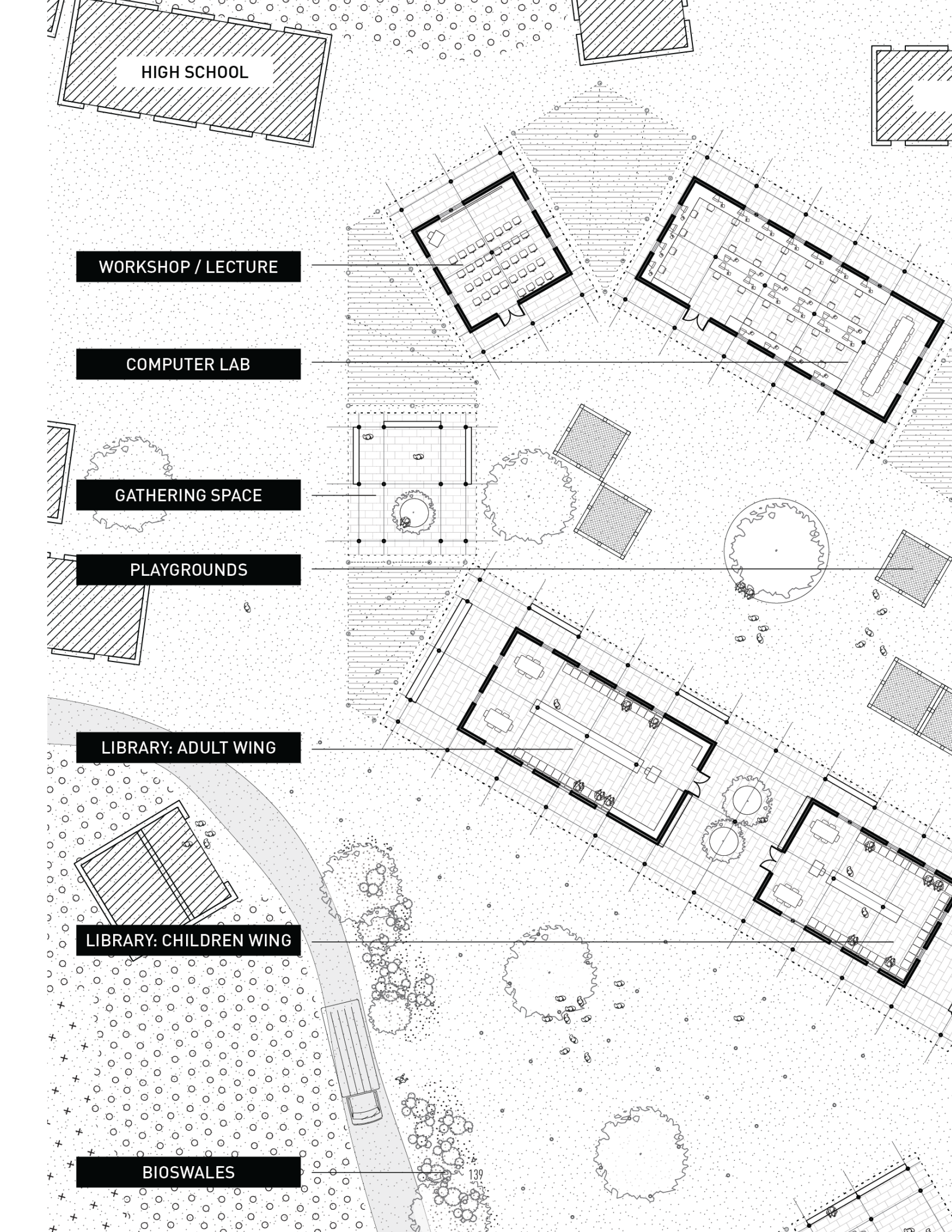
GATHERING SPACE

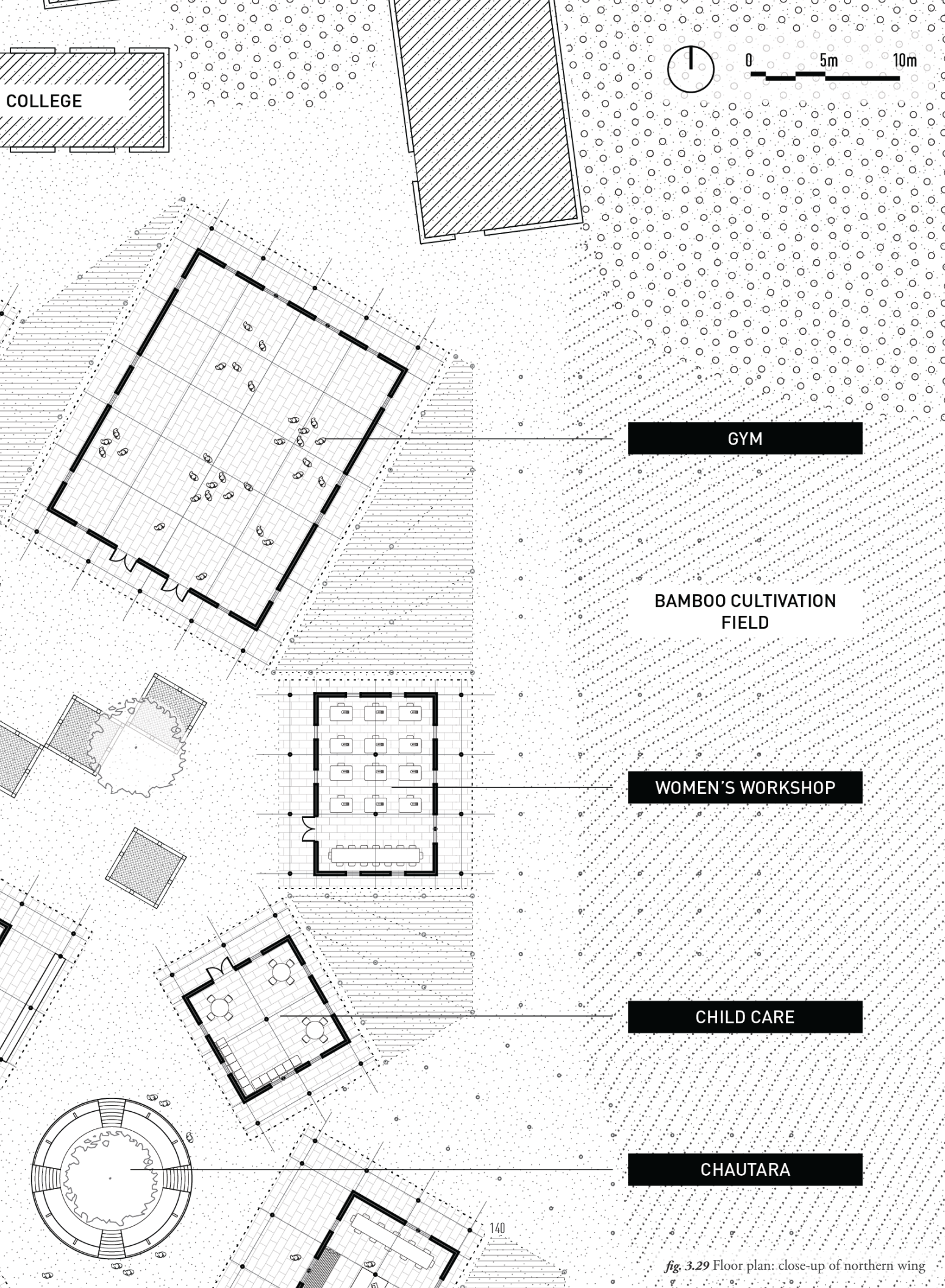
PLAYGROUNDS

LIBRARY: ADULT WING

LIBRARY: CHILDREN WING

BIOSWALES





0 5m 10m

GYM

**BAMBOO CULTIVATION
FIELD**

WOMEN'S WORKSHOP

CHILD CARE

CHAUTARA

140

fig. 3.29 Floor plan: close-up of northern wing

BIOSWALES

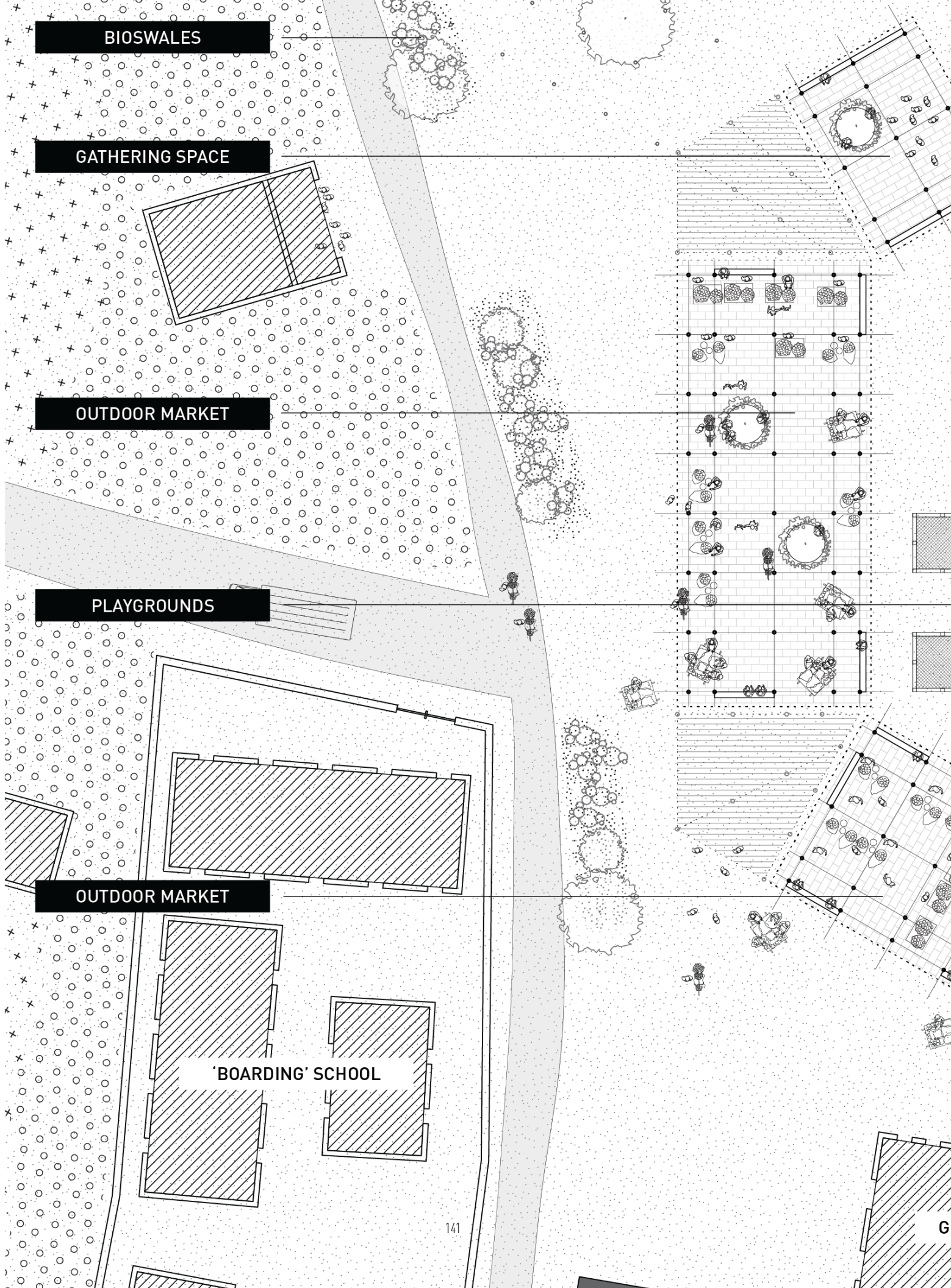
GATHERING SPACE

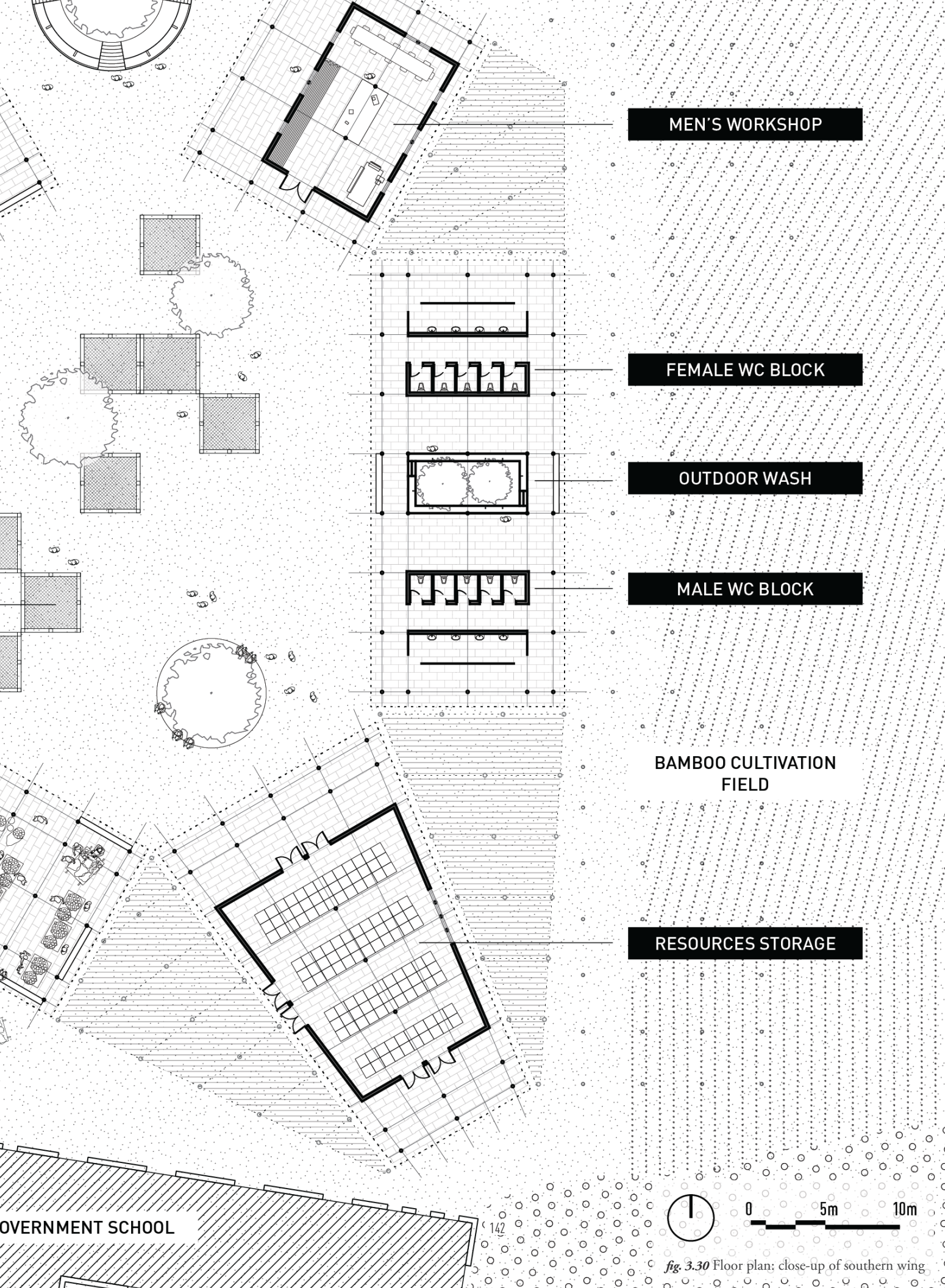
OUTDOOR MARKET

PLAYGROUNDS

OUTDOOR MARKET

'BOARDING' SCHOOL





MEN'S WORKSHOP

FEMALE WC BLOCK

OUTDOOR WASH

MALE WC BLOCK

BAMBOO CULTIVATION FIELD

RESOURCES STORAGE

GOVERNMENT SCHOOL



0 5m 10m

fig. 3.30 Floor plan: close-up of southern wing

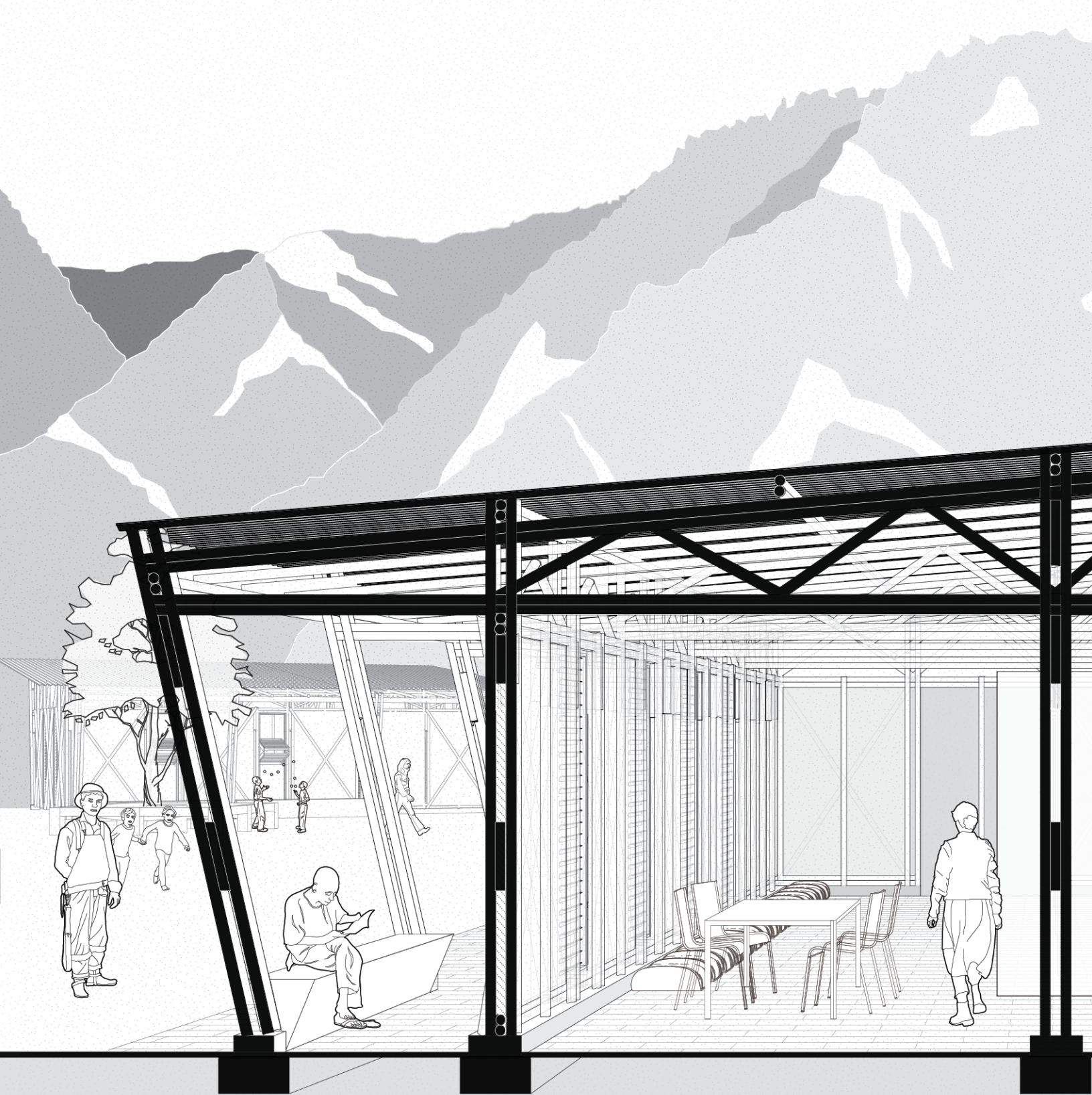
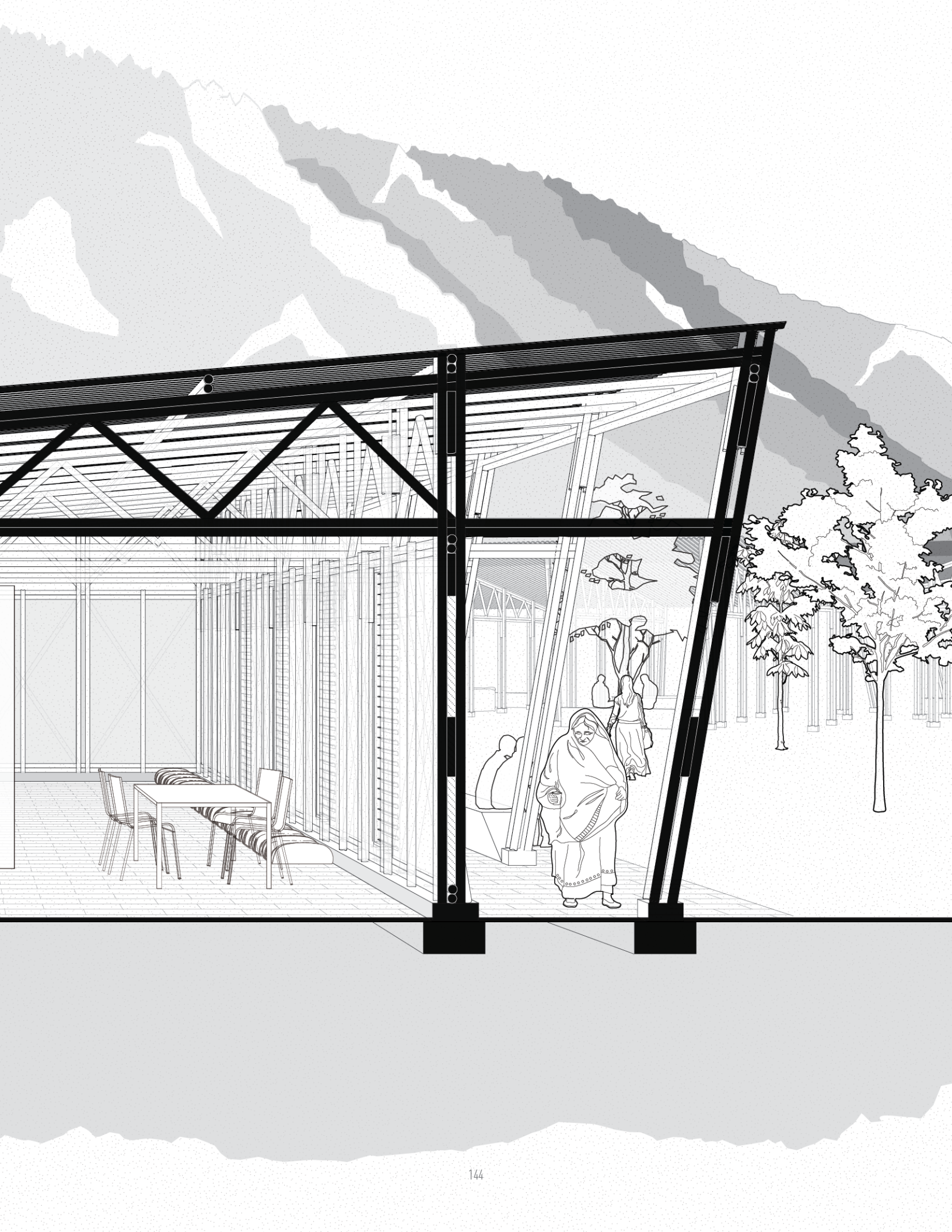


fig. 3.31 Cross section through the library







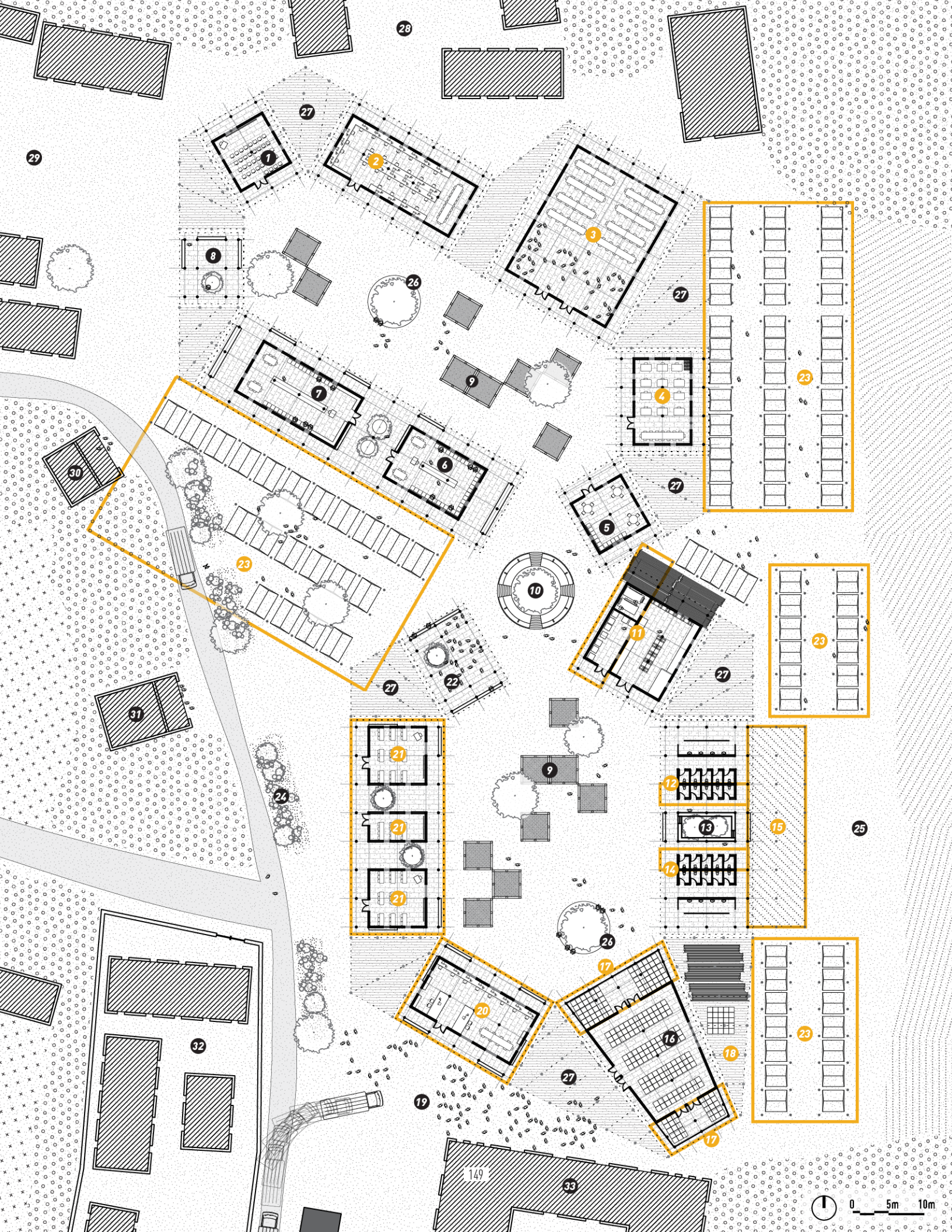
EMERGENCY PHASE

During the emergency phase, first priority of every affected community becomes survival, as people are gathering relief supplies, looking for survivors, searching for food and building temporary shelter. It is hard to imagine that children will continue to attend schools amid the chaos, even if facilities remain standing, unless the schools are located where the community is gathering post-disaster. Therefore in this phase, the hub transforms into a makeshift emergency centre, a new temporary home for the community. It will be a source for obtaining relief supplies, a designated location for an NGO or government response office, a location for a reliable communication system and safe water and wash facilities. Most importantly, it will become a hub where the community can come together and support each other.

In the aftermath of a disaster, families leave their homes and stay together in outdoor tents for weeks or months at a time. They search for basic survival supplies and wait in endless lines to receive government or international aid, if it ever arrives. Expanding from the existing bamboo structure, tarp can be put up around the perimeter of the facility, covering families' tents and providing additional protection from the rain. Men's workshop can be converted into a community kitchen, providing a designated and safe place to cook in the makeshift IDP camp. The gym can become a dining hall. The computer lab becomes a communications center, where people can get access to the internet to connect to their loved ones across the nation and abroad. They will also get access to a reliable power source to charge their phones. Some of the open market areas are converted into NGO or government emergency response office, which facilitates supply and distribution of emergency resources. Remaining open space under the CGI roof is converted into temporary classrooms, based on the assumption that some of the permanent schools in the area may collapse during an earthquake.

Considering that child trafficking intensifies post disaster, it is important that the centre becomes the safest space in town, as children will constantly be in the middle of the community life. This will also effectively locate the existing schools "in the backyards" of families' homes, making education as safe and accessible as it can possibly be in an emergency.

fig. 3.32 (previous page)
Perspective view; tarp put up around the perimeter of the building to protect temporary shelters from the rain in the emergency phase



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0 5m 10m



EMERGENCY PHASE

- 1 MEETING SPACE
- 2 COMPUTER LAB → COMMUNICATIONS CENTRE
- 3 GYM → DINING SPACE
- 4 WOMEN'S WORKSHOP → MEETING SPACE
- 5 CHILD CARE
- 6 LIBRARY, CHILDREN WING
- 7 LIBRARY, ADULT WING
- 8 OUTDOOR GATHERING AREA
- 9 CHILDREN PLAY AREA
- 10 CHAUTARA & POTABLE WATER TAPS
- 11 MEN'S WORKSHOP → COMMUNITY KITCHEN + EXTENSION
- 12 FEMALE WASHROOM + EXTENSION
- 13 OUTDOOR WASH AREA
- 14 MALE WASHROOM + EXTENSION
- 15 COVERED EXTENSION OF WASH AREA
- 16 EMERGENCY RESOURCE STORAGE
- 17 EXTENSION OF RESOURCE STORAGE
- 18 RESOURCE STORAGE EXTENSION
- 19 RESOURCE DISTRIBUTION AREA
- 20 TEMPORARY NGO OR GOVERNMENT OFFICE
- 21 TEMPORARY CLASSROOM
- 22 OUTDOOR GATHERING AREA
- 23 TEMPORARY EMERGENCY TENT SHELTERS
- 24 BIOSWALES
- 25 BAMBOO CULTIVATION
- 26 CHAUTARA
- 27 OUTDOOR TRELLIS-COVERED PUBLIC SPACE
- 28 COLLEGE (EXISTING)
- 29 HIGH SCHOOL (EXISTING)
- 30 SHOP (EXISTING)
- 31 STATIONERY SHOP (EXISTING)
- 32 "BOARDING" SCHOOL
- 33 GOVERNMENT SCHOOL (UNDER CONSTRUCTION)

fig. 3.33 Floor plan: emergency phase

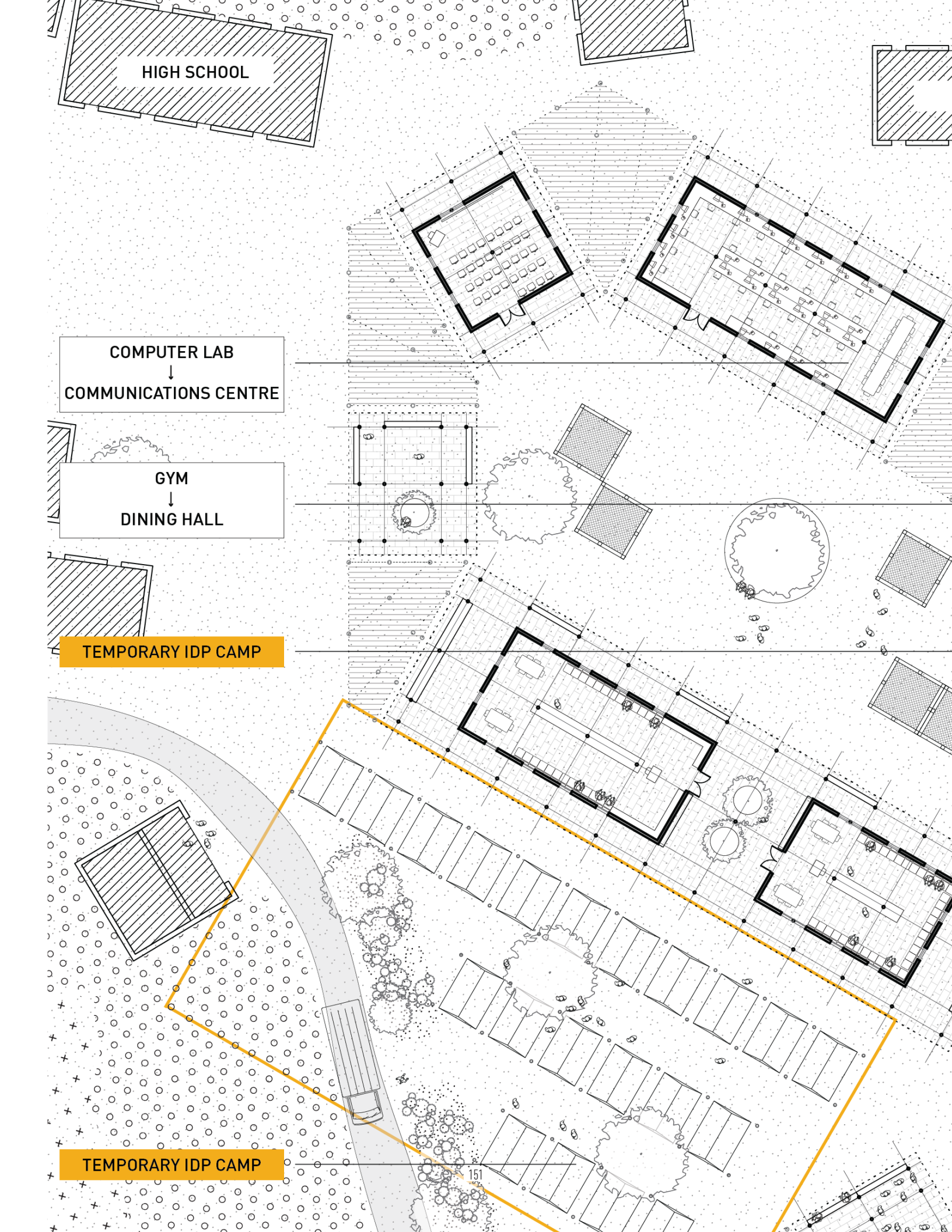
HIGH SCHOOL

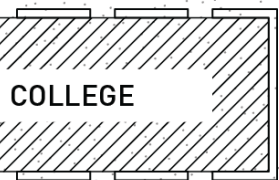
COMPUTER LAB
↓
COMMUNICATIONS CENTRE

GYM
↓
DINING HALL

TEMPORARY IDP CAMP

TEMPORARY IDP CAMP





0 5m 10m



fig. 3.34 Floor plan: close-up of northern wing

TEMPORARY IDP CAMP

COMMUNITY KITCHEN

WORKSHOP

COMMUNITY KITCHEN

TEMPORARY CLASSROOM

TEMPORARY CLASSROOM

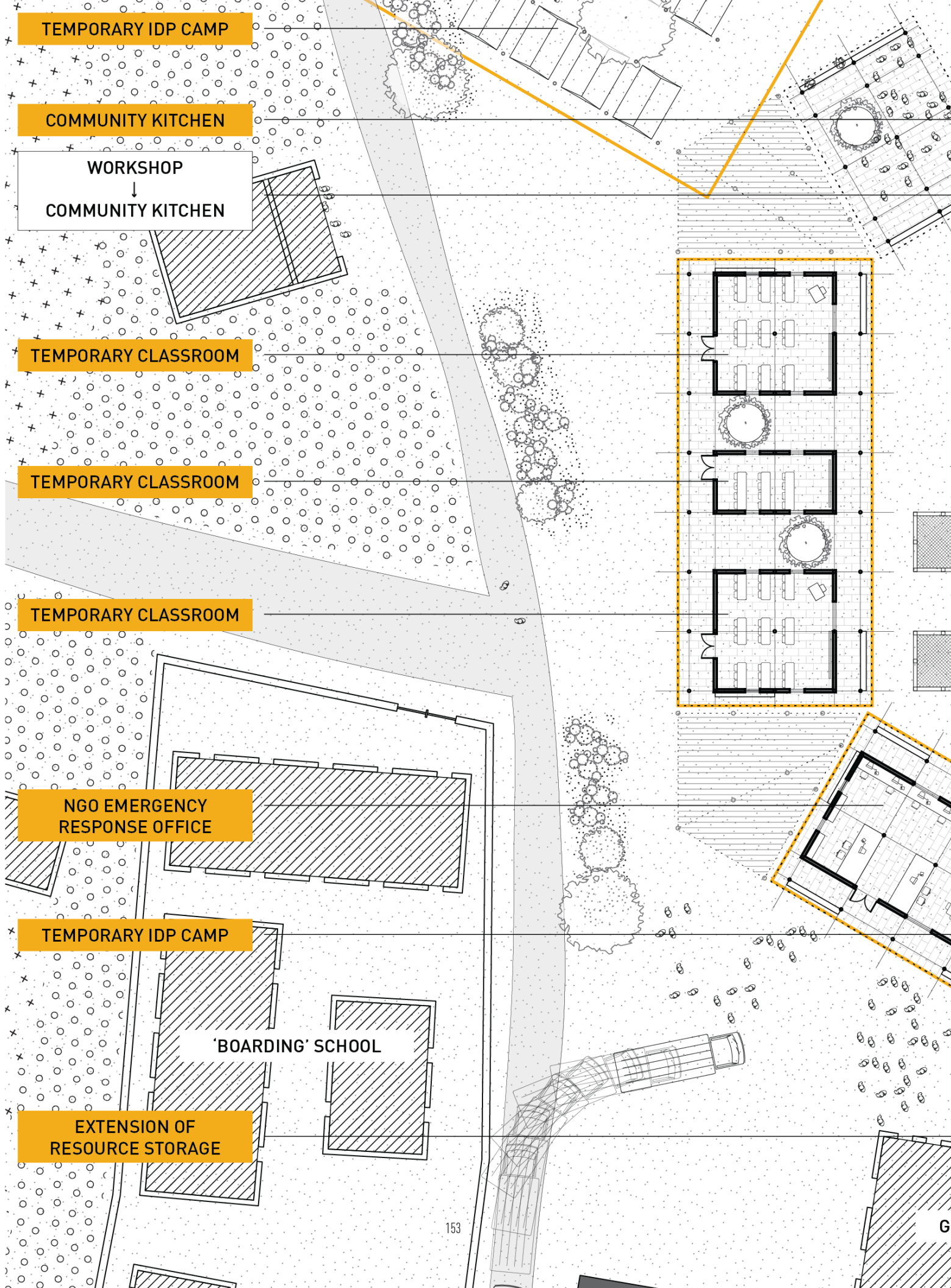
TEMPORARY CLASSROOM

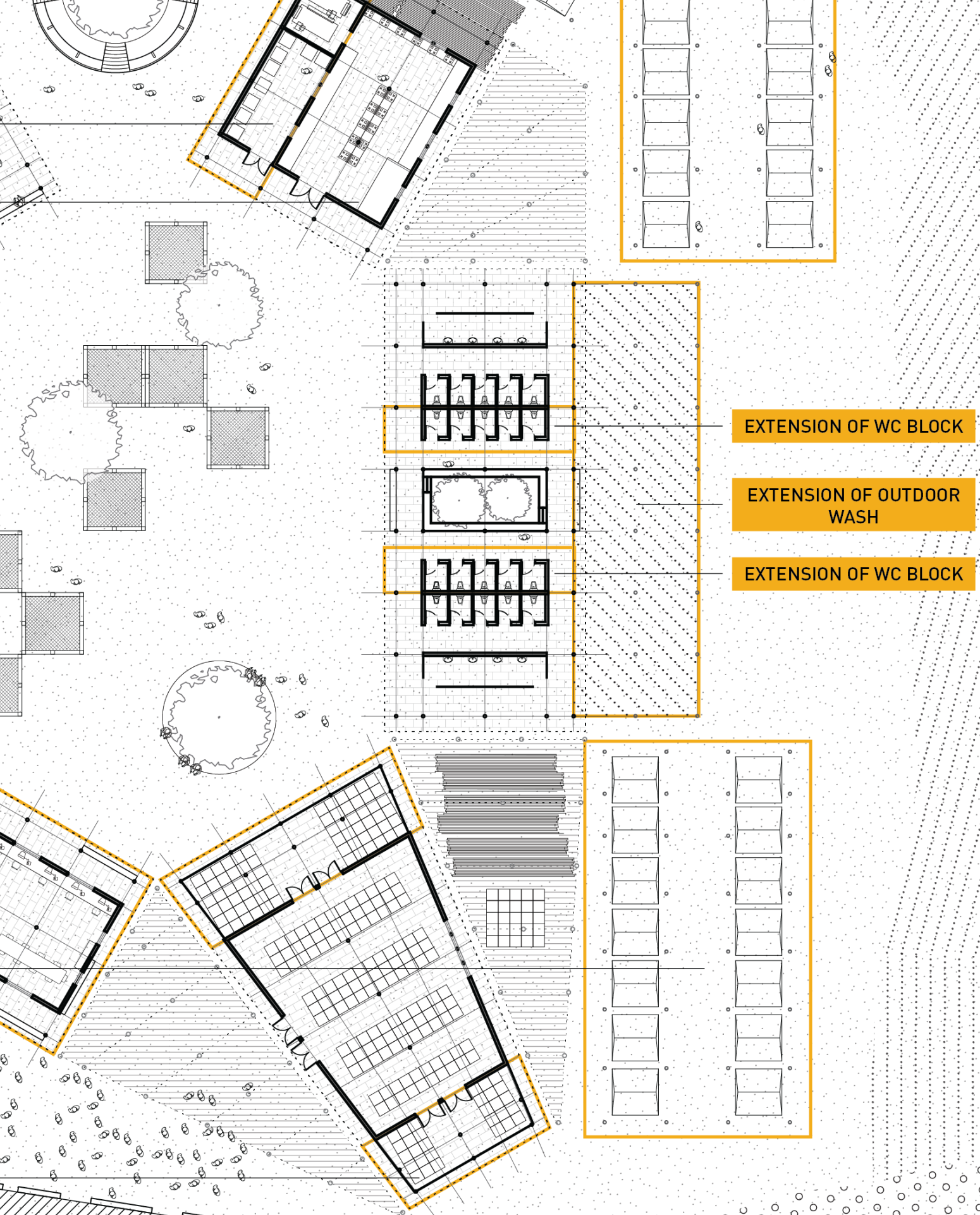
NGO EMERGENCY
RESPONSE OFFICE

TEMPORARY IDP CAMP

'BOARDING' SCHOOL

EXTENSION OF
RESOURCE STORAGE





EXTENSION OF WC BLOCK

EXTENSION OF OUTDOOR WASH

EXTENSION OF WC BLOCK

GOVERNMENT SCHOOL

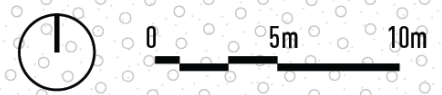


fig. 3.35 Floor plan: close-up of southern wing





RECOVERY PHASE

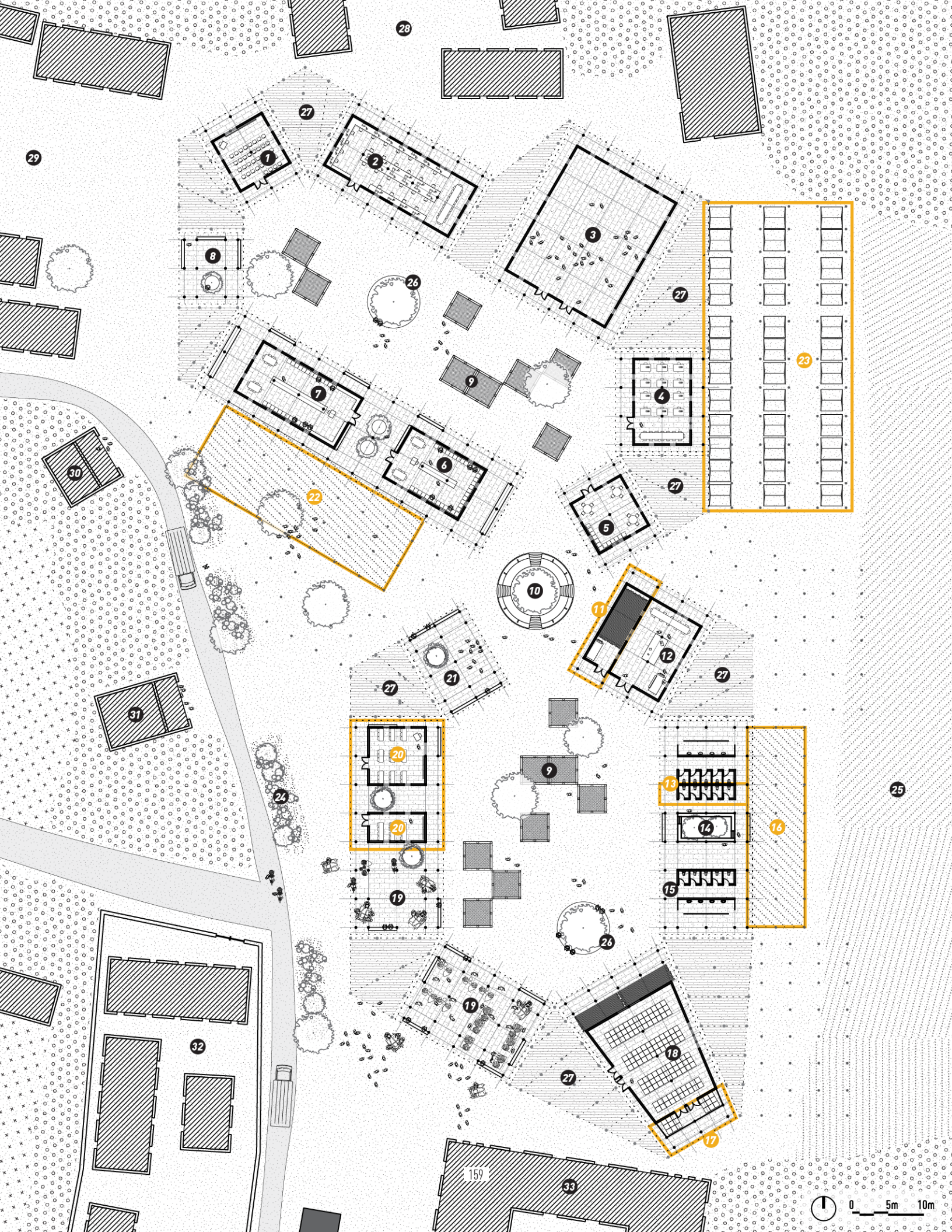
As affected areas move into recovery phase, daily lives stabilize, families begin to rebuild and move into their new homes; often it's still temporary shelters but located on their own property. Therefore in this phase, most of the areas designated to temporary shelters will be removed, with an exception of a small portion by the river. Some temporary classrooms will remain in place to accommodate students whose schools have collapsed, as buildings are slowly getting reconstructed.

More workshop and meeting spaces could be allocated to workshops on safe reconstruction practices, hygiene, and so on, run by organizations such as the Council for Technical Education and Vocational Training (CTEVT). As an example, National Society for Earthquake Technology-Nepal (NSET) is conducting a program called *Baliyo Ghar* ("Strong House") scheduled to run from October 2015-September 2020. It is geared towards supporting and training homeowners in safe construction practices through establishing "reconstruction technology centres, construction models, and demonstration homes".² The demonstration homes are built with the assistance of local residents, who learn proper construction techniques through practical training.³ After completion, these homes can be converted into a public building (such as a classroom or a community room) according to the community's needs.⁴ This proposal could accommodate such workshops in a more organized and structured manner.

As described in the previous section, financial burden of education is likely to become a lot more severe, as families are struggling to rebuild their homes. Simultaneously, households are trying to reestablish their livelihoods, which could have been affected by the disaster. Vocational training and workshop spaces are meant to aid families in reestablishing their sources of income, stabilizing them financially. The sooner the family returns to a stable financial condition, the sooner they can afford to send their children to school again.

As it can take years for public schools to be rebuilt in rural areas, child trafficking is still an important issue. By making the proposal an active hub during the reconstruction phase, it also becomes a safe space for children during and after school hours.

fig. 3.36 (previous page) Perspective view; approaching the site from the city centre



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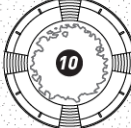
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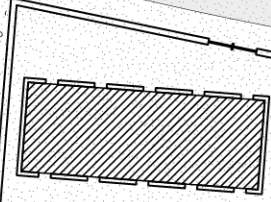
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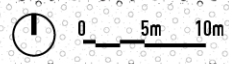
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RECOVERY PHASE

- 1 WORKSHOP / MEETING SPACE
- 2 COMPUTER LAB
- 3 GYM
- 4 FEMALE CRAFTS ORIENTED WORKSHOP
- 5 CHILD CARE
- 6 LIBRARY, CHILDREN WING
- 7 LIBRARY, ADULT WING
- 8 OUTDOOR READING AREA
- 9 CHILDREN PLAY AREA
- 10 CHAUTARA & POTABLE WATER TAPS
- 11 EXTENSION OF THE MALE WORKSHOP (STORAGE)
- 12 MALE CRAFTS ORIENTED WORKSHOP
- 13 FEMALE WASHROOM + EXTENSION
- 14 OUTDOOR WASH AREA
- 15 MALE WASHROOM
- 16 COVERED EXTENSION OF WASH AREA
- 17 EXTENSION OF RESOURCE STORAGE
- 18 EMERGENCY RESOURCE STORAGE
- 19 COVERED OUTDOOR MARKET
- 20 TEMPORARY CLASSROOMS
- 21 OUTDOOR GATHERING SPACE
- 22 COVERED OUTDOOR SPACE FOR COMMUNITY GATHERINGS (POSSIBILITY FOR EXTENSION)
- 23 TEMPORARY EMERGENCY SHELTERS (TARP OVERHEAD)
- 24 BIOSWALES
- 25 BAMBOO CULTIVATION
- 26 CHAUTARA
- 27 OUTDOOR TRELLIS-COVERED PUBLIC SPACE
- 28 COLLEGE (EXISTING)
- 29 HIGH SCHOOL (EXISTING)
- 30 SHOP (EXISTING)
- 31 STATIONERY SHOP (EXISTING)
- 32 "BOARDING" SCHOOL
- 33 GOVERNMENT SCHOOL (UNDER CONSTRUCTION)

fig. 3.37 Floor plan: recovery phase

HIGH SCHOOL

TEMPORARY IDP CAMP

EXTENSION FOR
COMMUNITY EVENTS

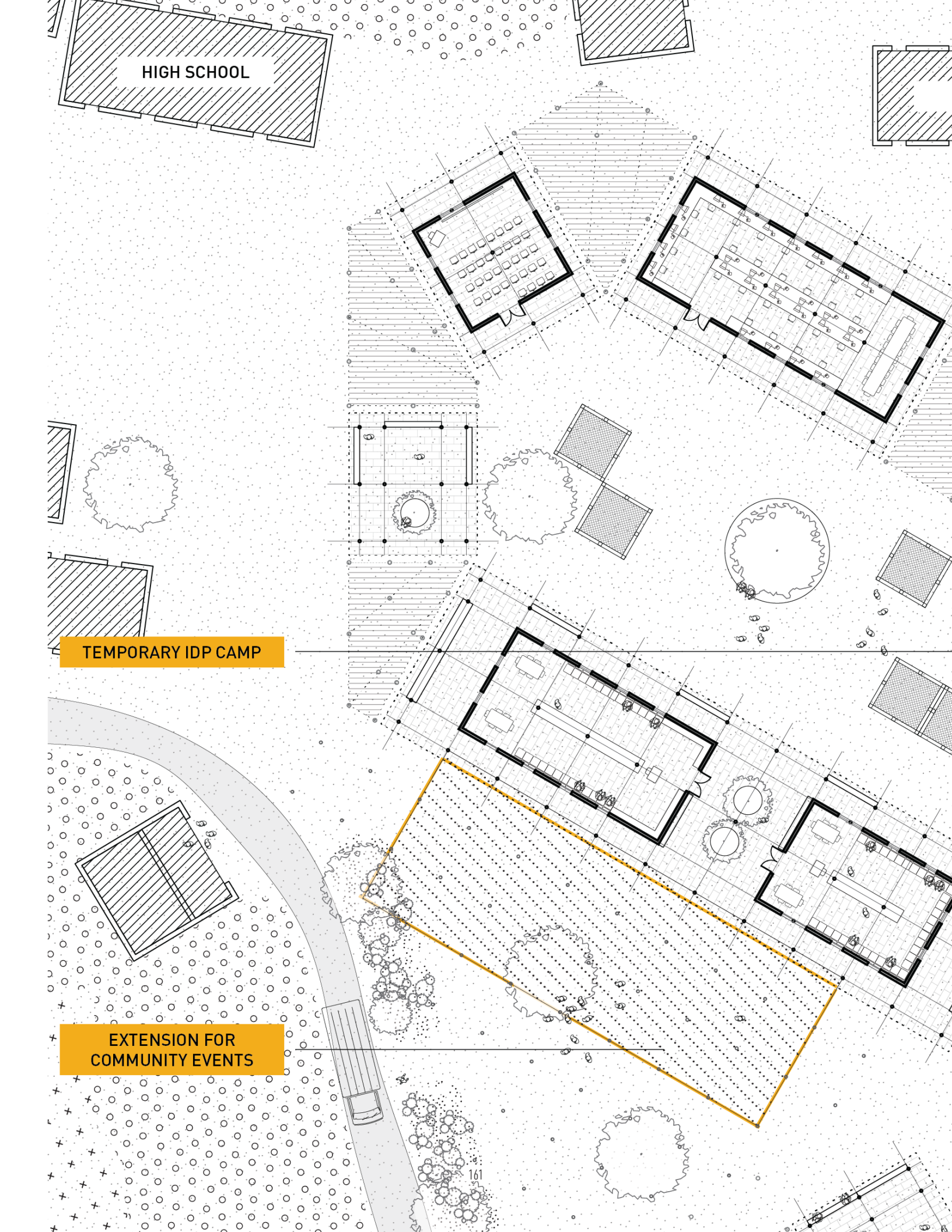




fig. 3.38 Floor plan: close-up of northern wing

WORKSHOP EXTENSION

TEMPORARY CLASSROOM

TEMPORARY CLASSROOM

'BOARDING' SCHOOL

**EXTENSION OF
RESOURCE STORAGE**



EXTENSION OF WC BLOCK

EXTENSION OF OUTDOOR WASH

GOVERNMENT SCHOOL

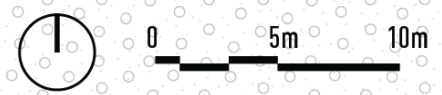
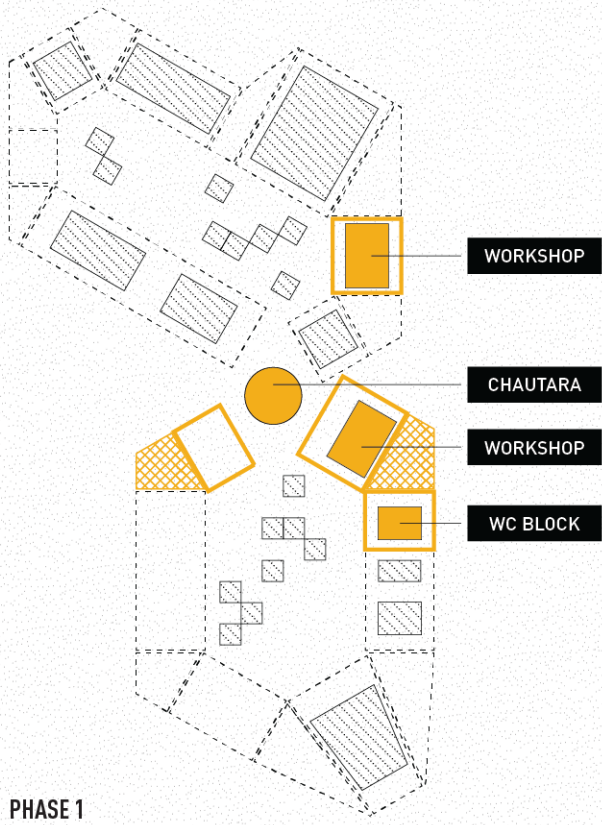
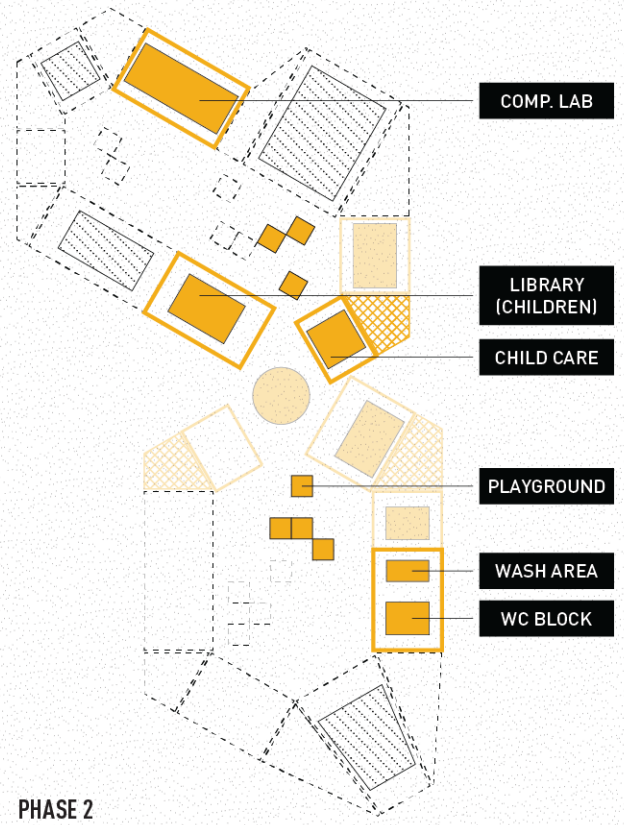


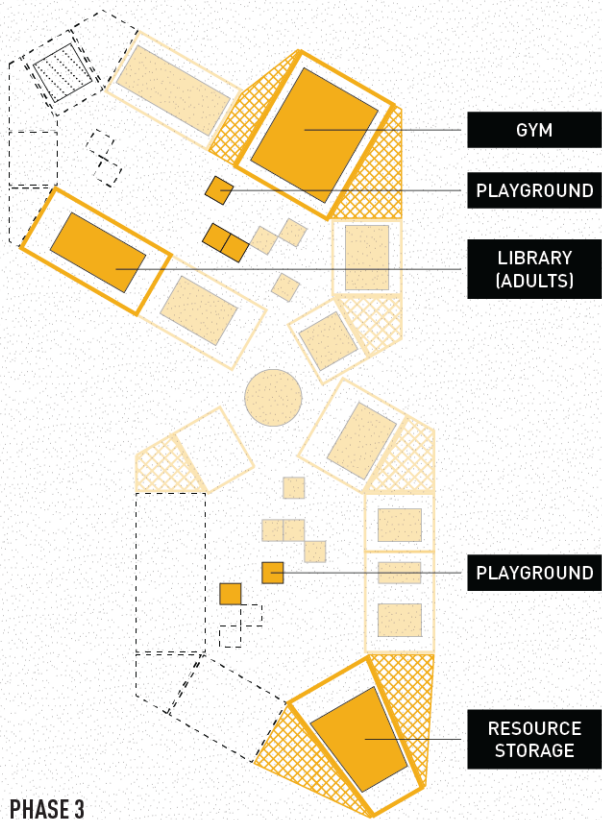
fig. 3.39 Floor plan: close-up of southern wing



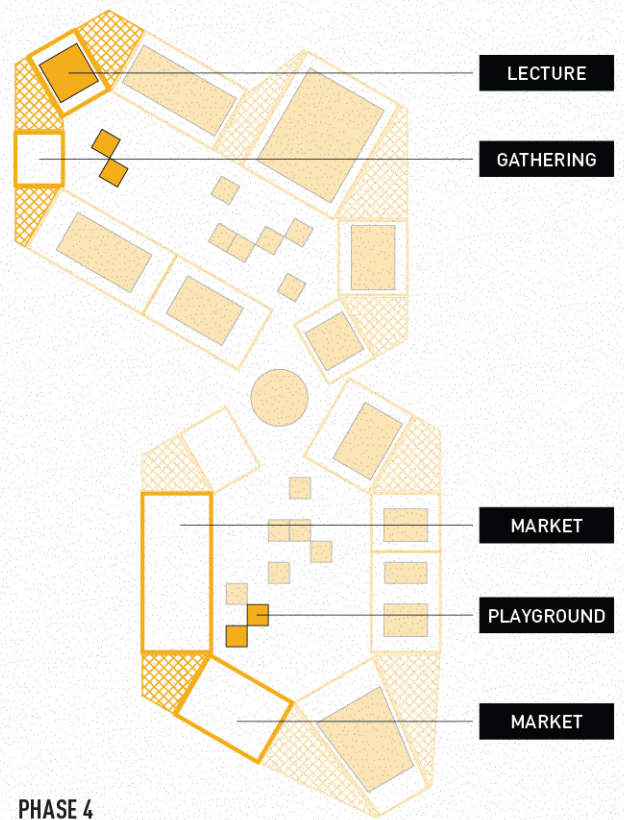
PHASE 1



PHASE 2



PHASE 3



PHASE 4

PHASING

Acknowledging that the scale of this proposal is larger than any NGO or government-funded program will generally take on, it is thus treated as a Master Plan project. An NGO with a set amount of funding may choose to complete just Phase 1, the most essential program. Another NGO may provide the funding for Phase 2. Perhaps community is able to pool together funds to complete Phase 3, while Phase 4 could be done through governmental aid. Whatever the funding sequence, the project is able to be completed in phases without sacrificing the overall functioning of the facility.

fig. 3.40 (opposite page)
Phasing diagram, showing one possible scenario of the completion of the facility.

PHASE 1

Phase 1 will have the most essential programs completed: female and male workshop spaces, community chautara with potable water taps, gathering / market space and washrooms.

PHASE 2

Phase 2 will continue to expand on higher importance programs: child care, one wing of the library, computer lab, wash area and extension of the washroom block, along with a portion of playgrounds.


PHASE 3

Phase 3 will see the construction of the gym, second wing of the library, resource storage facilities and more playground areas.

PHASE 4

Phase 4 will complete the Master Plan with construction of a workshop / meeting space, outdoor gathering / market areas and remainder of the playgrounds.

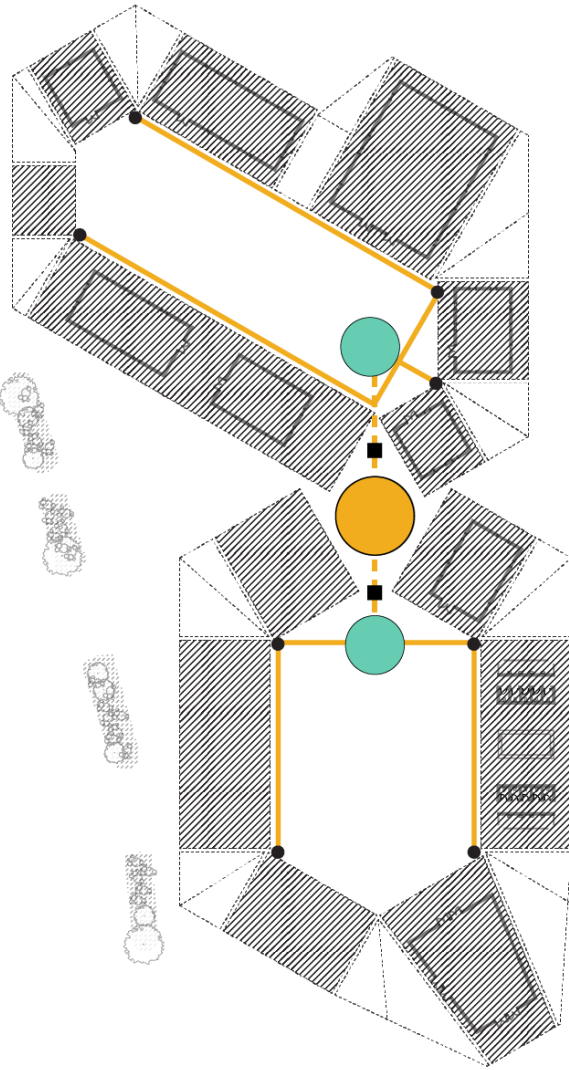
LEGEND

-  FOUNDATIONS, STRUCTURE & CGI ROOF
-  PROGRAM
-  BAMBOO TRELLIS








WATER MANAGEMENT

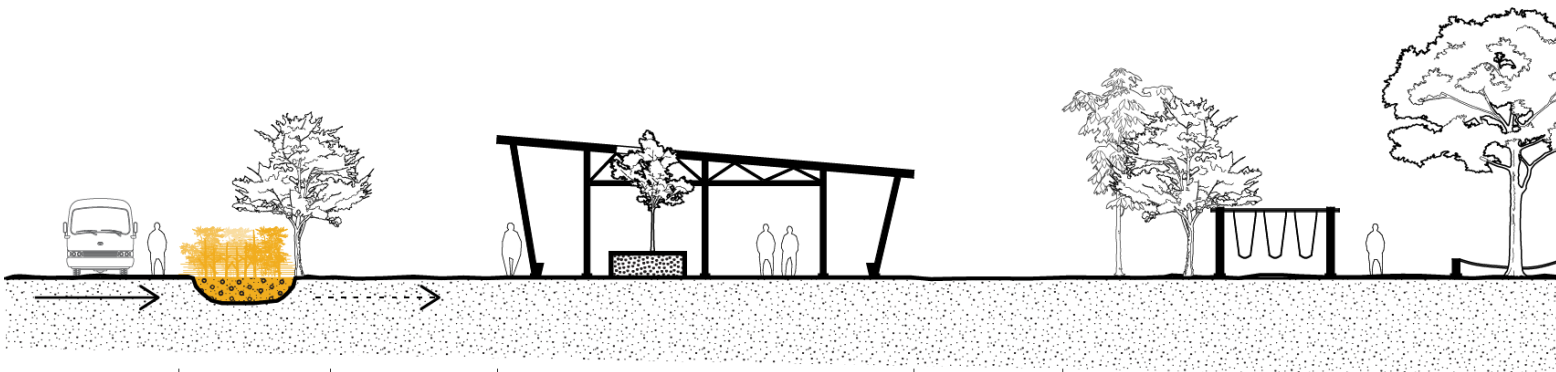
Water management was given a special consideration in the design of the facility. Provision of a clean drinking water source and appropriate wash facilities are important components of the program. Every CGI roof is connected to a system of pipes, bringing rainwater to collection tanks, where it gets filtered and stored underneath a *chautara*, ready for consumption. Storm water management also required special attention. As the site is located at the base of hill, it will receive a lot of runoff during monsoon rains, as the adjacent plots of land have been clear-cut for agriculture. To remedy that, a series of bioswales are proposed on the west side of the site. They can help retain some of the storm water coming down from the adjacent hills, helping reduce flooding on the site by slowly releasing the water into the river. Bamboo cultivation field is planted on the east side of the site, directly adjacent to the river, to help with soil retention and preventing erosion. In order to conserve potable water, outdoor wash facility is located on the east side, piping the water from the river.

fig. 3.41 (next page)
Diagram of water
management strategies
employed in the proposal



RAINWATER COLLECTION SYSTEM

-  MAIN WATER STORAGE TANK (POTABLE WATER SUPPLY)
-  RAINWATER COLLECTION TANKS
-  PIPES TRANSFERRING WATER FROM COLLECTION TO STORAGE
-  PUMP AND WATER FILTERS
-  PIPES TRANSFERRING RAINWATER TO COLLECTION TANKS
-  PIPE COLLECTION POINT
-  ROOF AREA AVAILABLE FOR RAINWATER COLLECTION



bioswales help retain rainwater runoff from adjacent hills and reduce flooding of the site

BIOSWALE

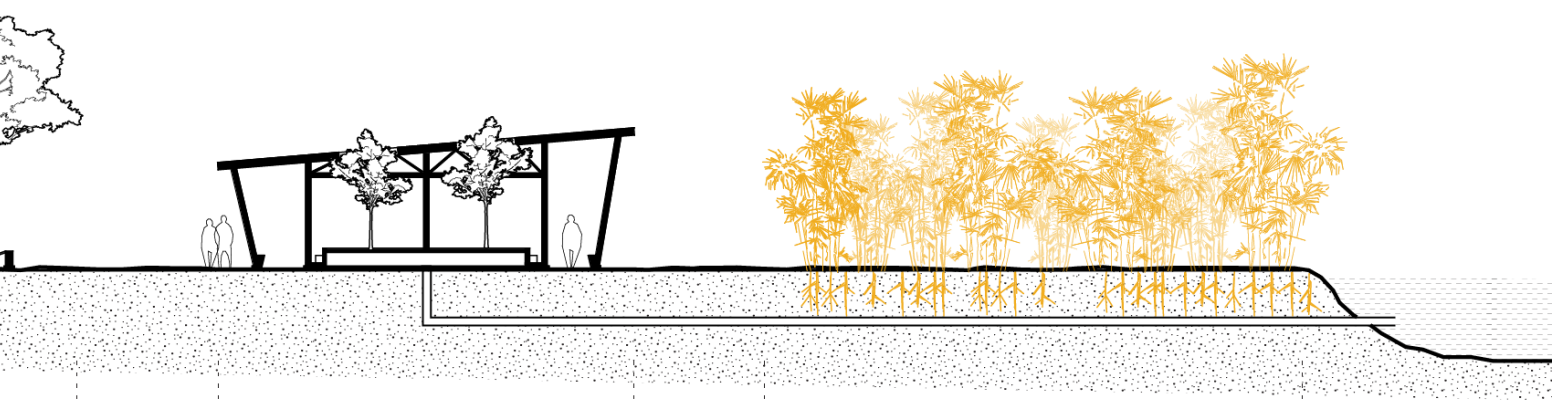
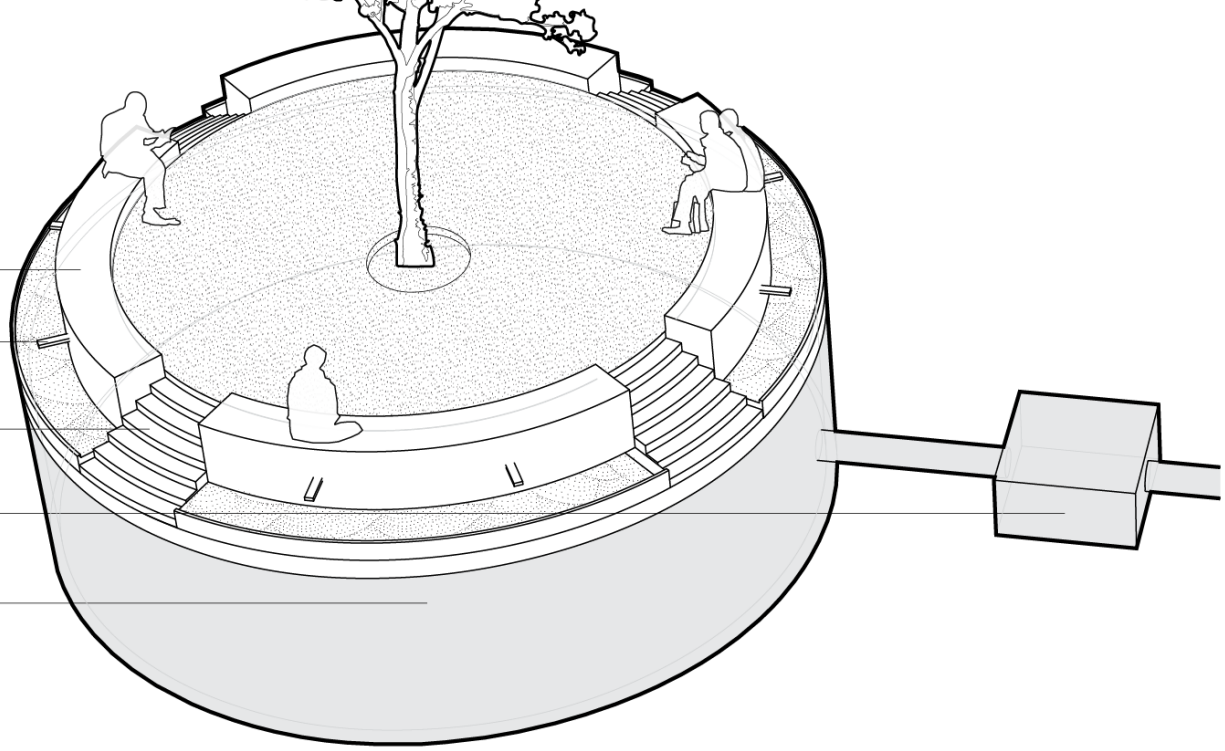
OUTDOOR COVERED MARKET

COURTYARD + PLAY AREAS

CHAUTARA:
POTABLE WATER STORAGE AND
DISTRIBUTION



- SEATING AT THE CHAUTARA
- WATER TAPS
- STAIRS UP TO THE CHAUTARA
- PUMP AND FILTER
- BELOW GRADE POTABLE WATER STORAGE TANK



WASH area gets the water supplied from the adjacent river

bamboo has an extensive root system that retains water and holds soil in place, reducing chances of landslides

WASH AREA

BAMBOO CULTIVATION AREA

CHAPTER 3.4

CONSTRUCTION

As mentioned in the earlier sections, the Design Catalogue published by Nepal Rural Housing Reconstruction Program was produced to guide rural households in safe reconstruction practices. Produced in two volumes, it incorporates earthquake resistance measures that have to be adhered to if the family wants to receive government funding for house reconstruction. However, various construction methods specified in the manual heavily rely on professional expertise and use of cement and rebar, which many families cannot afford and the government reconstruction grant is insufficient to cover. As noted by Surya Bhaktha Sangachhe, Director General of the Department of Urban Development and Building Construction (Government of Nepal), more than 90% of houses are constructed by families themselves, according to their needs and financial situations.¹ As a result, many households revert back to vernacular construction, which is unsuitable for the seismic zone.

Recognizing the financial barriers many families are facing, this proposal explores how bamboo can be elevated from the status of “the poor man’s wood” to demonstrate how it can be a safe, affordable, sustainable and beautiful alternative to masonry and concrete. The main aspiration is that through showcasing the benefits of bamboo through construction of a public building, families will begin to apply it to construction of their own homes as well.

Bamboo has been recognized for its excellent structural performance in many seismic regions. After Colombia’s earthquake of 1999, which devastated the country’s coffee region, the Columbian Association of Seismic Engineering produced a manual, an unofficial building code, for seismically resistant bamboo construction. It is intentionally diagrammatic and provides general guidelines in a way that could be understood by anyone outside of the construction or engineering industry. The principles described in the publication have been carefully applied to the design of the proposal.

Bamboo is a grass plant that grows on every continent except Europe, adapting to a range of climatic conditions. Particular species of bamboo are among the fastest growing plants in the world. On average, most commonly cultivated species grow 3-10cm per day, and reach their full height within a single growing season (3-4 months). It takes another 2-5 years for the culms to harden and be ready for use in construction. Its extensive root network helps to anchor down the soil and reduce soil erosion due to heavy rains and flooding, which is an immense problem in higher altitude areas of Nepal. Furthermore, bamboo is able to retain water inside its stem during monsoon season and use it in the drier months, conserving water. In terms of earthquake resistance, bamboo is an ideal material as it has a high strength-to-weight ratio, it is flexible and has a high capacity to absorb energy.² In order to reach its full structural capacity, bamboo needs to be properly dried and chemically treated against insects.³ *Bambusa Nutans* is local species of bamboo that is specified as acceptable for construction in the Design Catalogue (Nepal Rural Housing Reconstruction Program).⁴

STONE MASONRY IN CEMENT MORTAR



Technology for Earthquake Resistant Building Construction (Two Storied Building, Stone in Cement Mortar)


 Nepal Housing Reconstruction Programme	TYPE OF HOUSE:	MODEL SMC	SCALE:	None	DATE:	SMC
	DRAWING TITLE:	TECHNICAL DETAIL 2 (SEISMIC ELEMENTS)		DESIGNED BY: DUDBC		

fig. 3.42 Page 60 of the Design Catalogue for Reconstruction of Earthquake Resistant Houses (Volume I), published by Nepal Rural Housing Reconstruction Program showing seismically appropriate construction techniques for a house built of stone masonry using cement mortar.

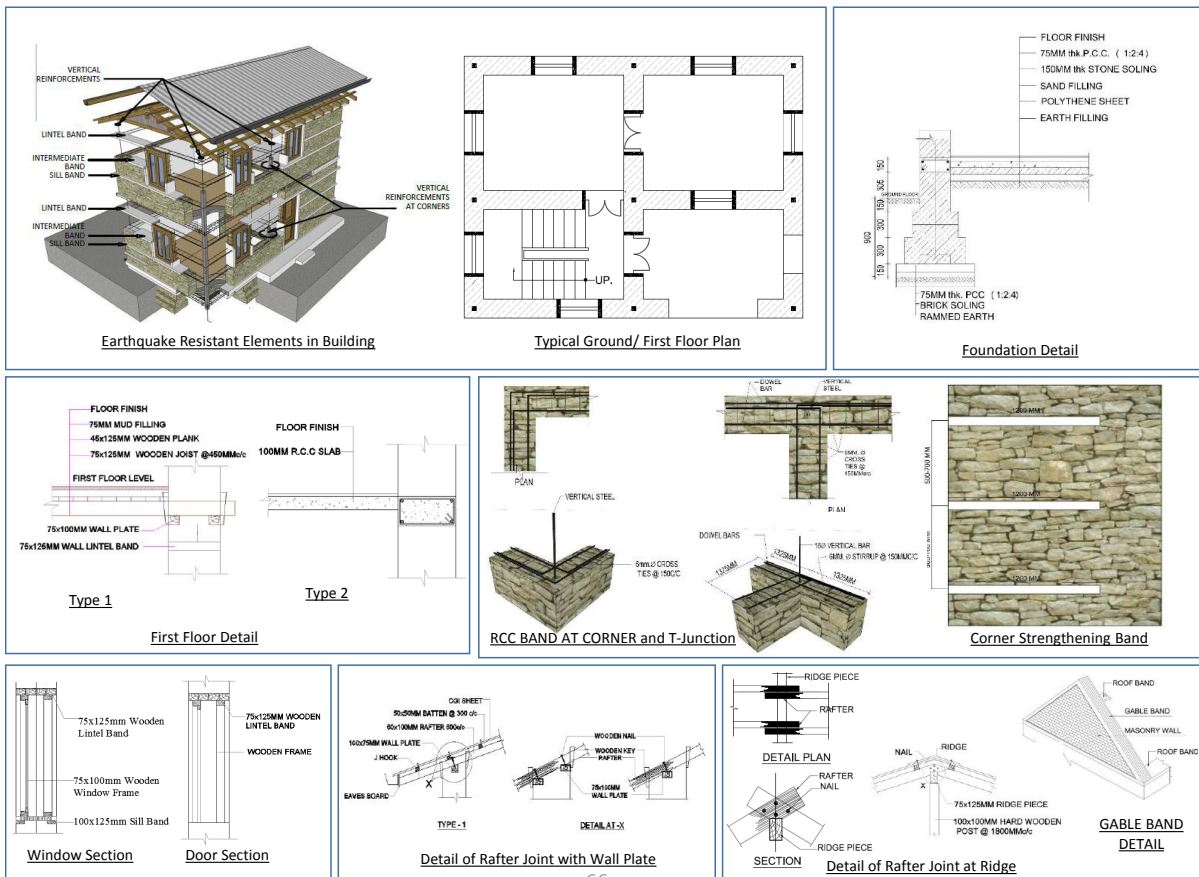


fig. 3.43 Page 66 of the Design Catalogue for Reconstruction of Earthquake Resistant Houses (Volume I), published by Nepal Rural Housing Reconstruction Program showing seismically appropriate construction techniques for a house built of stone masonry using cement mortar.

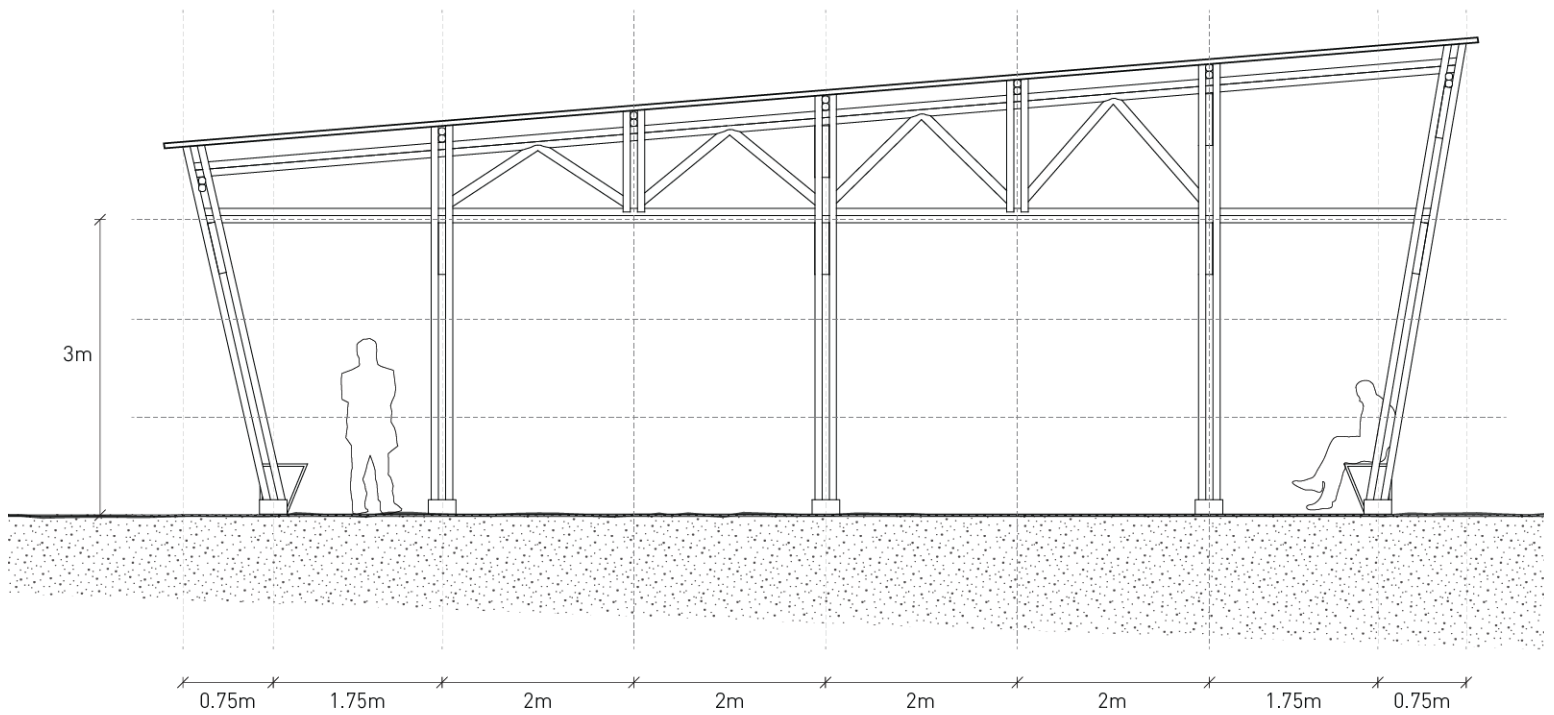
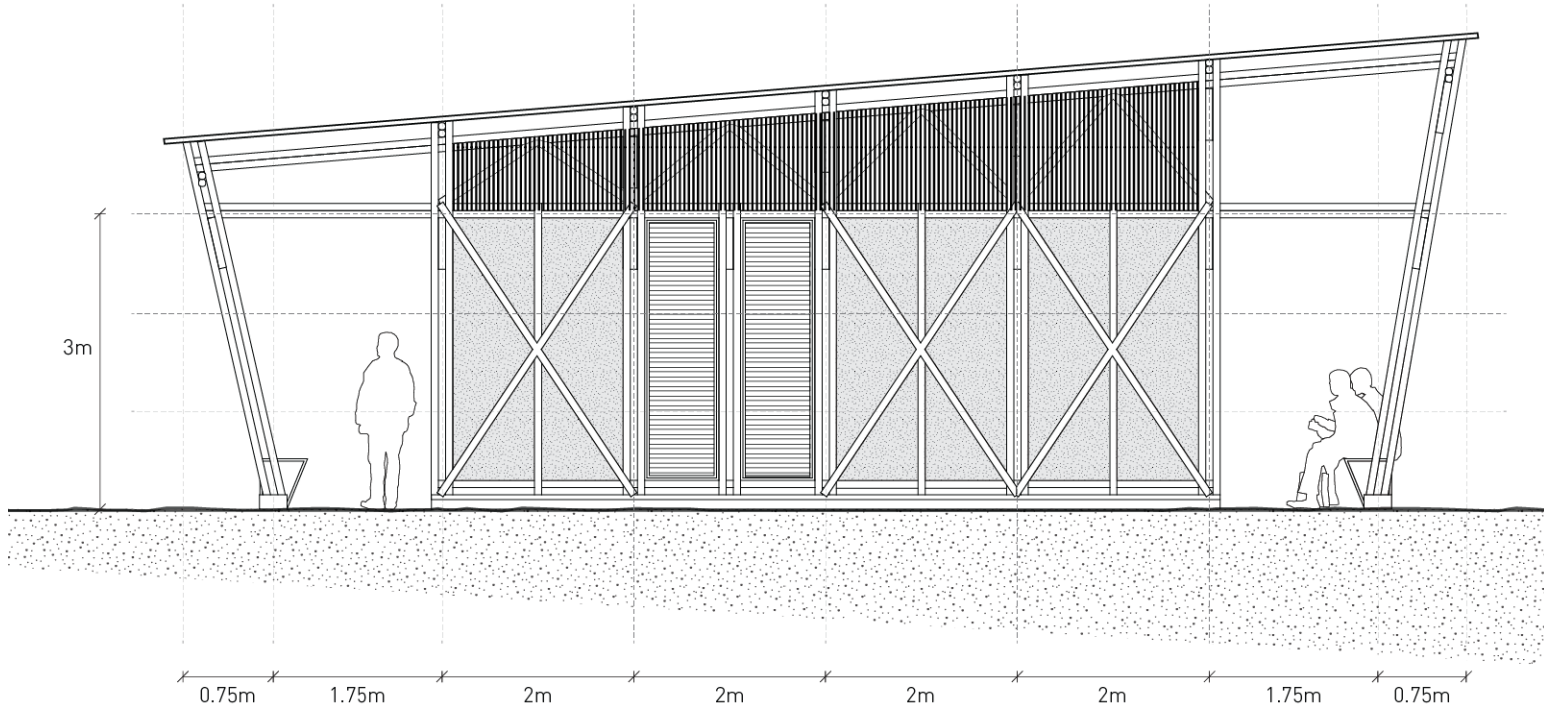


fig. 3.44 Elevation view of two construction types: enclosed program (top) and open-air public spaces (bottom), both underneath a light CGI roof

Seismic principles have been considered from the very beginning of the design process, back to the site strategies phase. The overall “figure eight” shape of the facility was broken down into simple rectangular buildings, allowing them to act independently in an event of an earthquake. In order to complete the figure eight form, lightweight, open-air bamboo trellises were inserted at corners that connect opaque CGI roofs over permanent masses and provide outdoor transition spaces between the program. CGI is the most common roofing material in Nepal; it is also incredibly light, which is a crucial factor in seismic design. Skylights are introduced to bring more natural light inside the volumes. To avoid complex installation and added weight, some CGI sheets are replaced by clear corrugated polycarbonate.

The CGI roofs are supported by a set of bamboo columns and trusses. Each column, which acts more as a pier, is constructed of four bamboo members joined together by filling a single node with cement mixture and putting a metal screw across. Bamboo slats are secured between columns and support the mixture of mud and straw that make up the thickness of the walls. As walls are non-bearing elements, they can be kept relatively thin and light, which is an important consideration in seismic zones.

To further promote the use of bamboo in local construction, a bamboo cultivation field is planted on the west side of the site. Being a fast growing plant, the field can be used by the local community for house construction, as well as being an immediately-available resource pool in times of an emergency. In case of an earthquake, the bamboo can be used to build temporary emergency shelters without having to wait for supplies to arrive from Kathmandu.

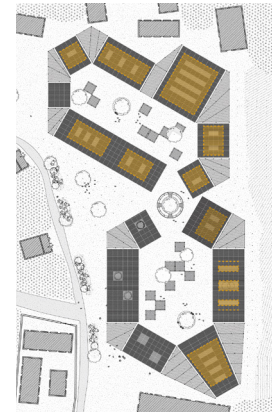
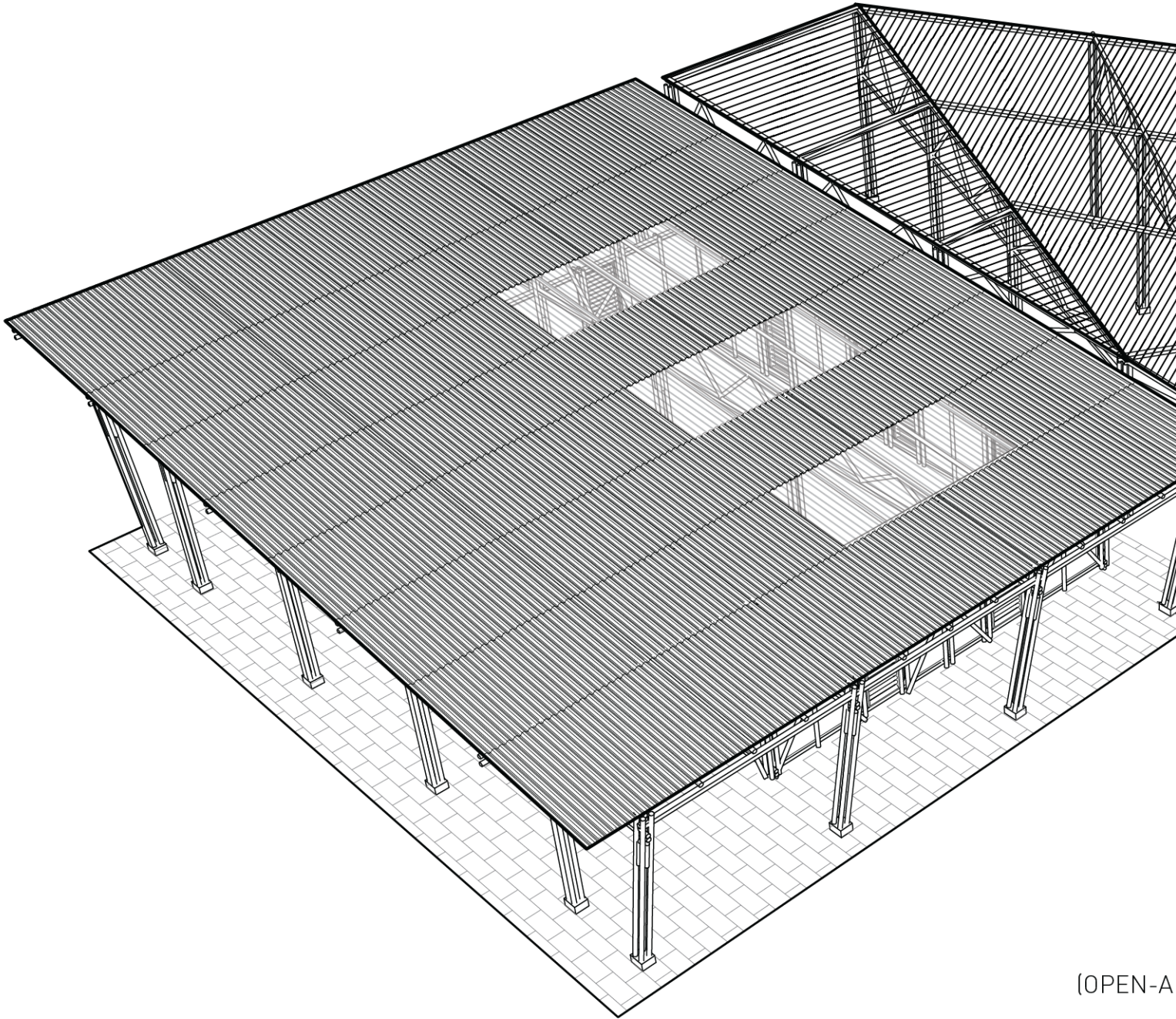
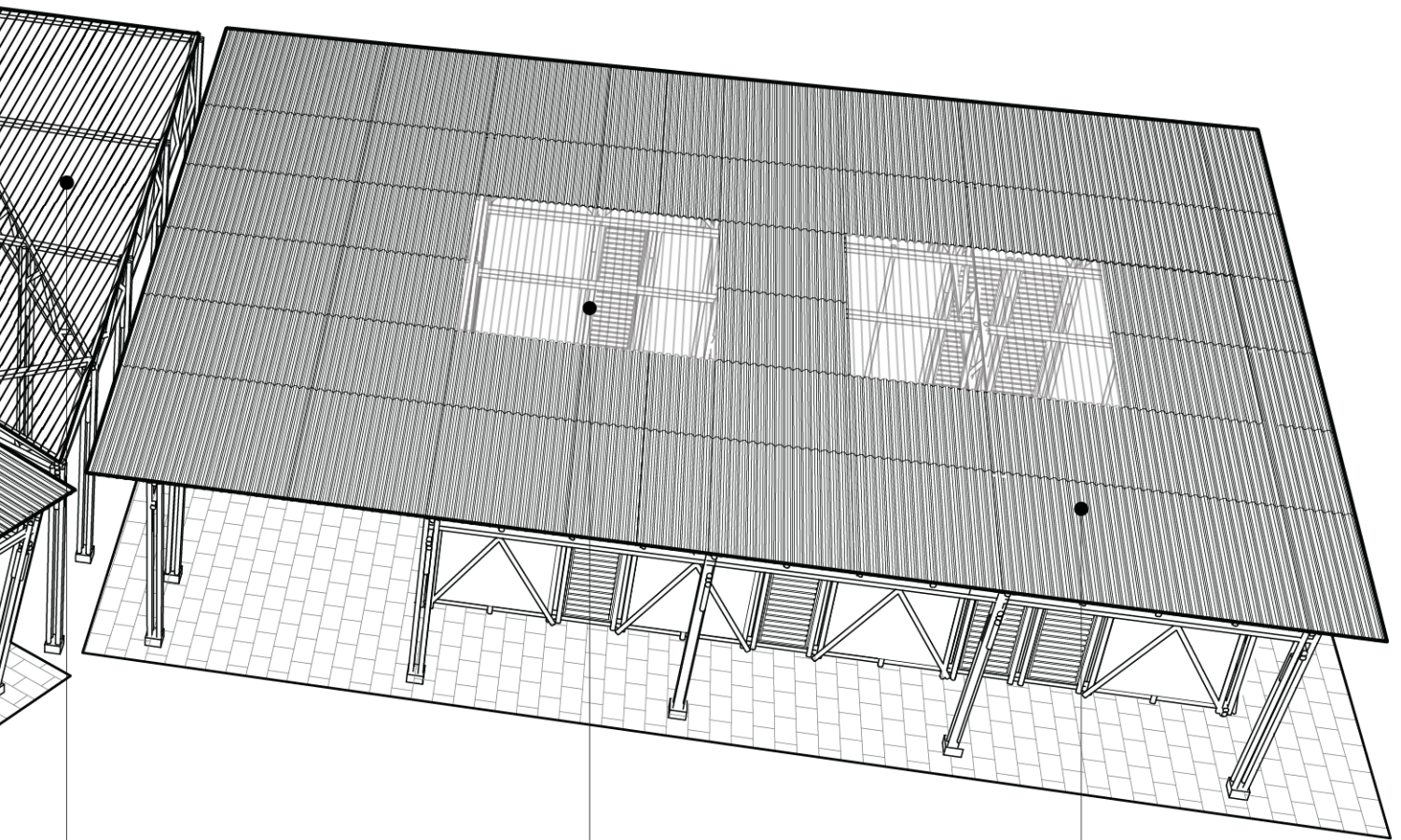


fig. 3.45 Simple rectangular volumes (in yellow) underneath CGI roof, where each section acts independently from each other



[OPEN-A

fig. 3.46 Roof system diagram



TRELLIS
(R, LIGHT BAMBOO)

SKYLIGHTS
(CLEAR CORRUGATED
POLYCARBONATE)

ROOF
(CGI, CORRUGATED METAL)

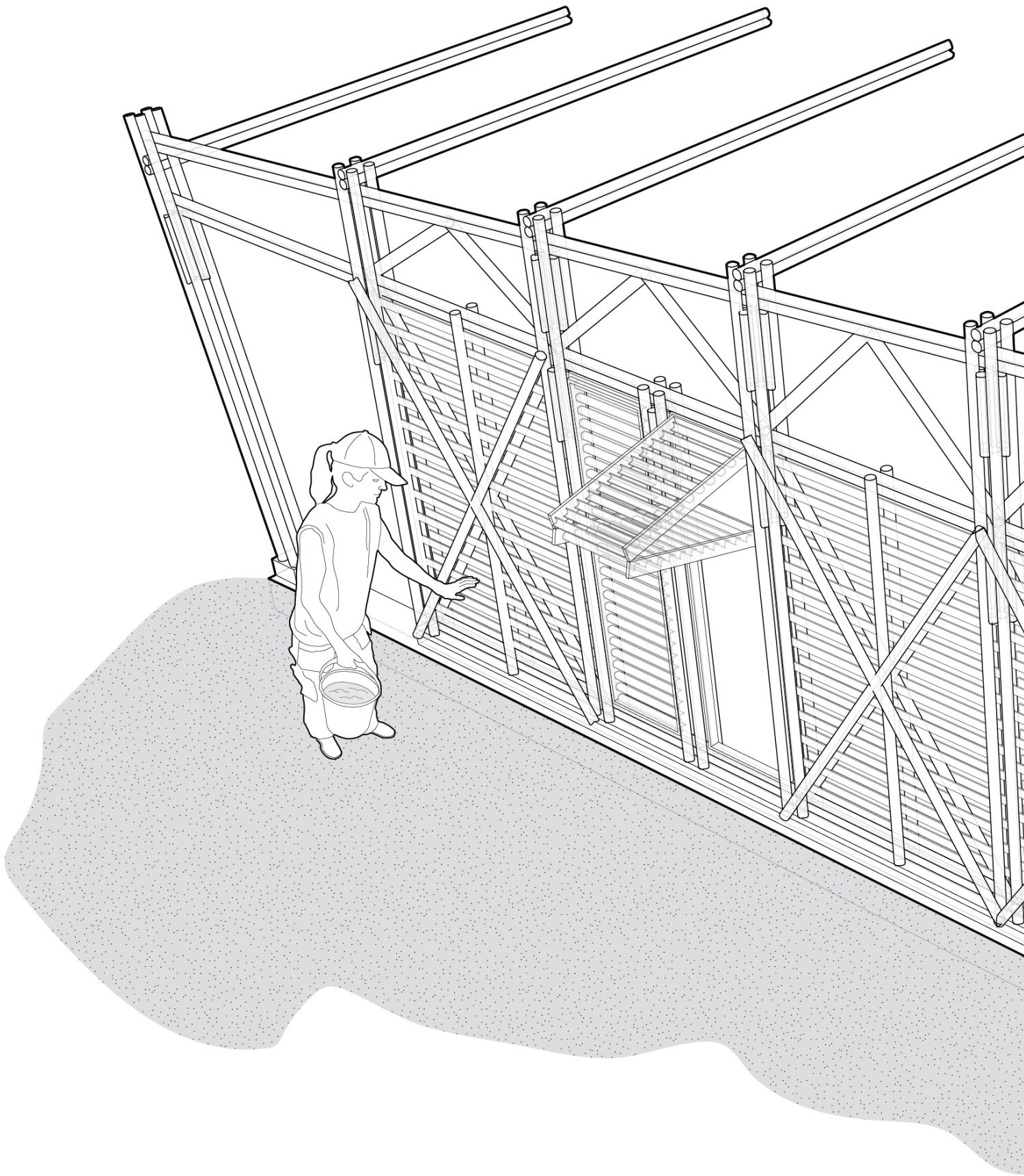
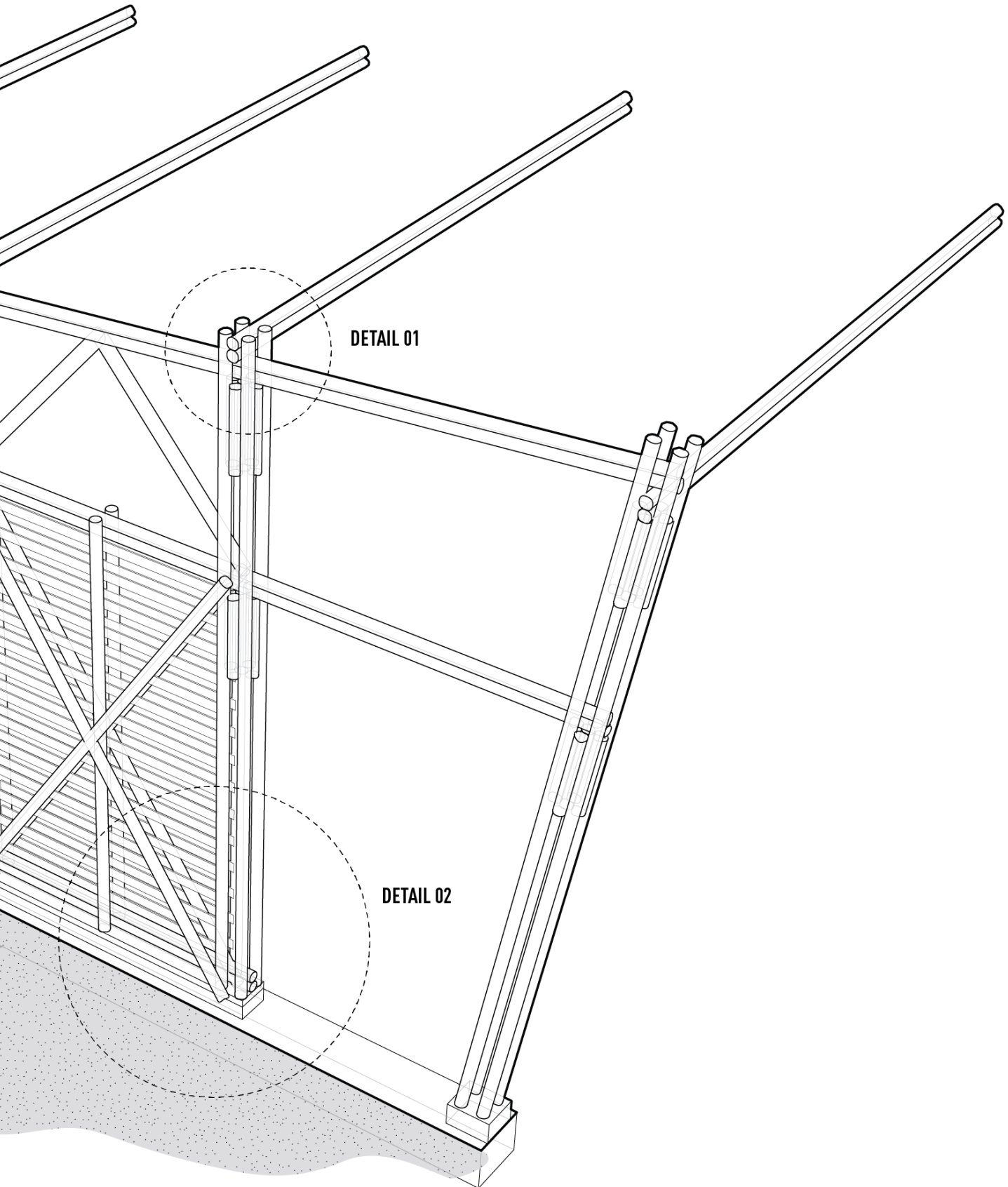


fig. 3.47 Typical wall assembly diagram



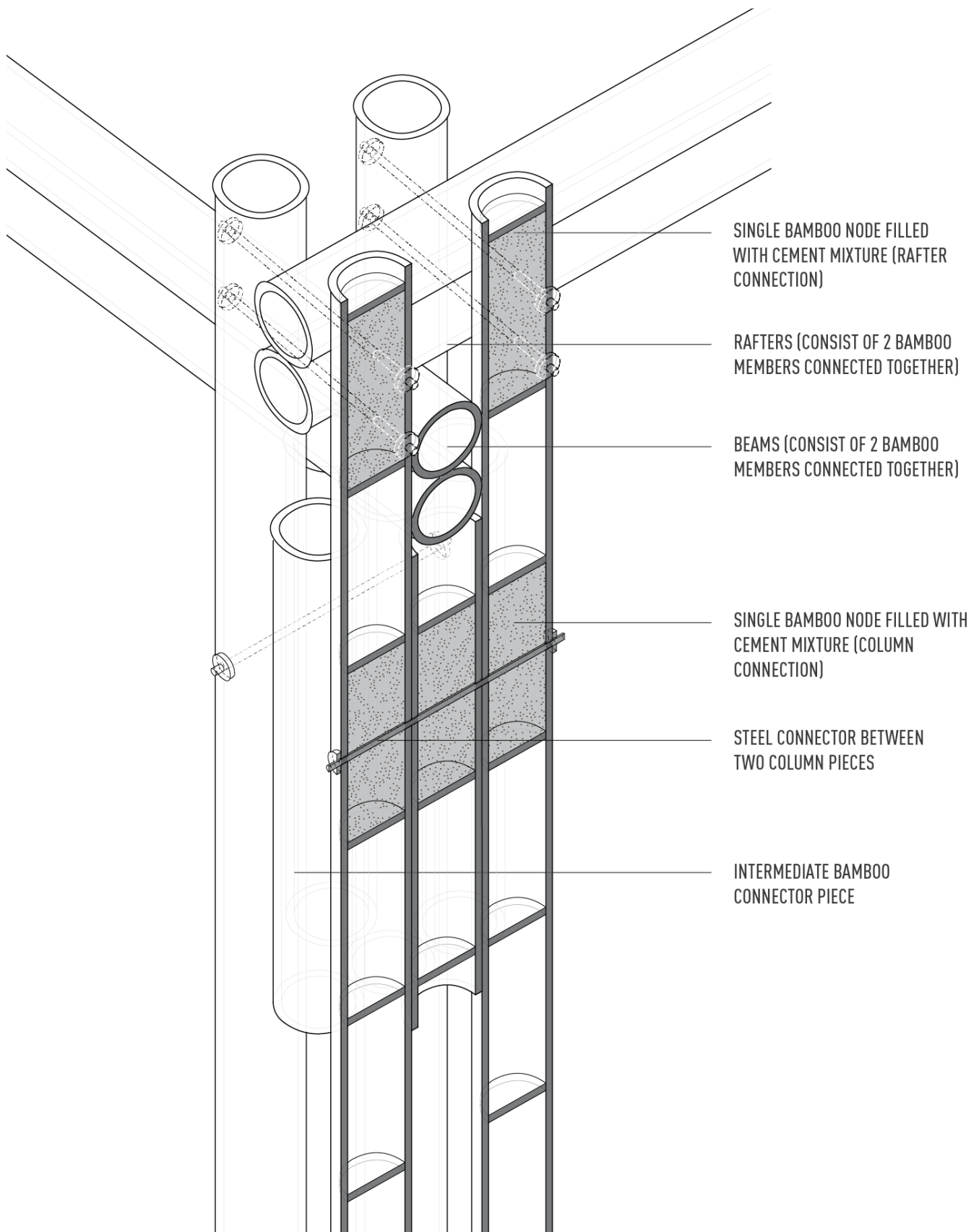


fig. 3.48 Detail 01: column to beam connection

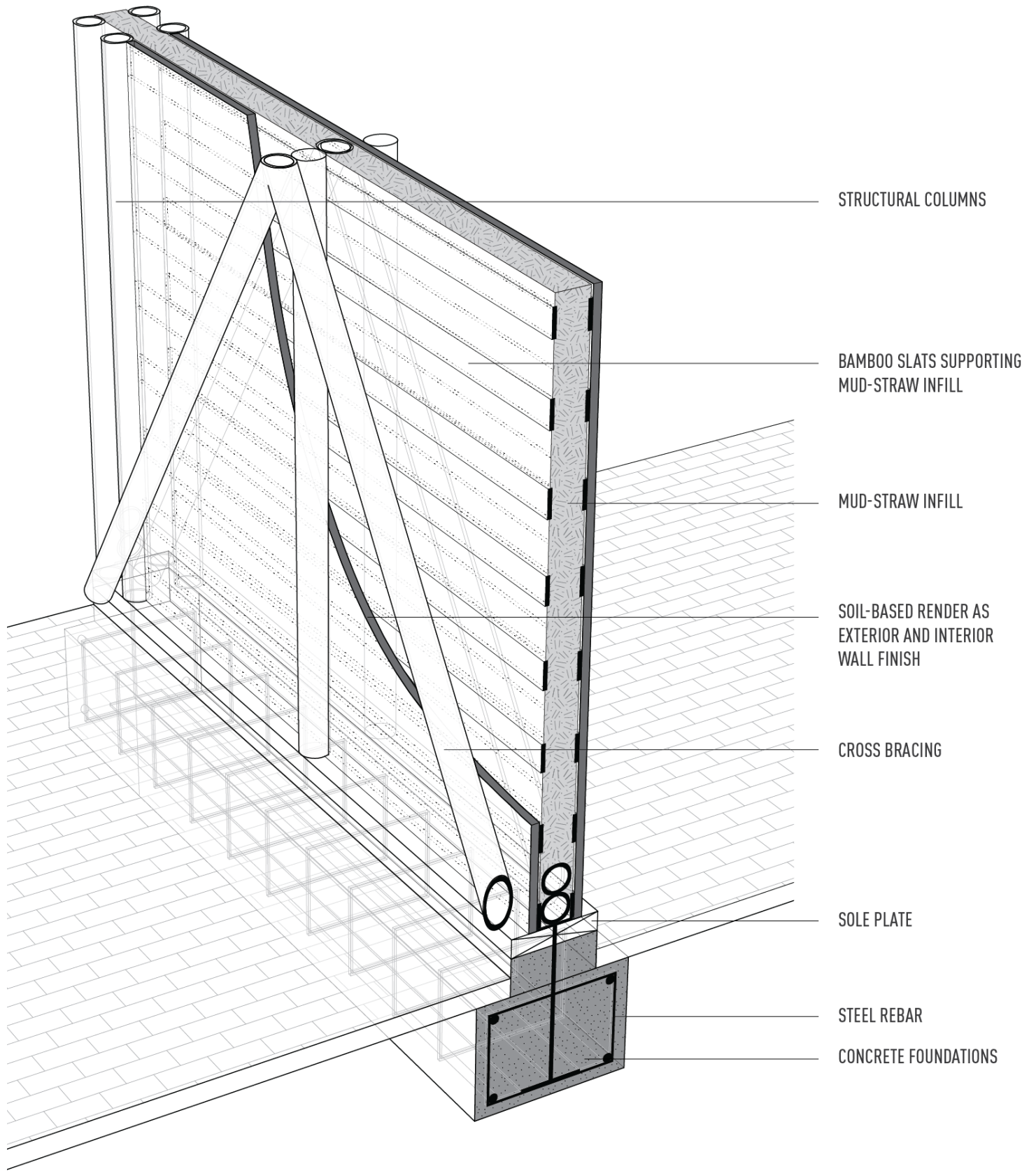


fig. 3.49 Detail 02: typical wall section



fig. 3.50 Aerial view of the proposed site

CHAPTER 3.5

DESIGN PROPOSAL: ALTERNATIVE SCALE

The full scale of the proposal described in the previous section is located in Trishuli (a *sadarmukam* town), and addresses a population estimated to be several thousand people. Considering the scale of Trishuli, it is able to support such an extensive program as the number of people using it, and thus the requirement for the facilities, is considered to be high. However, a far greater number of settlements in Nepal are rural, located along the hills surrounding *sadarmukam* towns. The second scale of the proposal is looking at how the proposed program can be reduced to a bare minimum in order to be supported by a settlement of several hundred people and be able to maintain its full functionality.

SITE

The site is located in a valley about 4.5km north of Pharping, another *sadarmukam* town 20km south of Kathmandu. As local buses only go as far as the city centre, it takes over an hour to walk from the bus stop to the site, gaining around 300m elevation moving higher into the surrounding hills. The closest school is about 25min walk from the site towards Pharping, with the city centre containing more public facilities such as schools, a hospital, places of worship, and banks. The site itself is a typical plot for a rural area in Nepal, located on a rather steep incline, with houses and agricultural plots sparsely spread out across the surrounding hills.

Note: The work presented in this chapter “Design Proposal: Alternative Scale” was produced and submitted for an international architecture student competition, which called for a design of a community centre in Nepal. It was organized by ARCHsharing Student Competitions.

fig. 3.51 View of the site,
looking south into the valley
photo: ARCHsharing
Photographie



fig. 3.52 View of the
site, looking north
photo: ARCHsharing
Photographie



PROGRAM

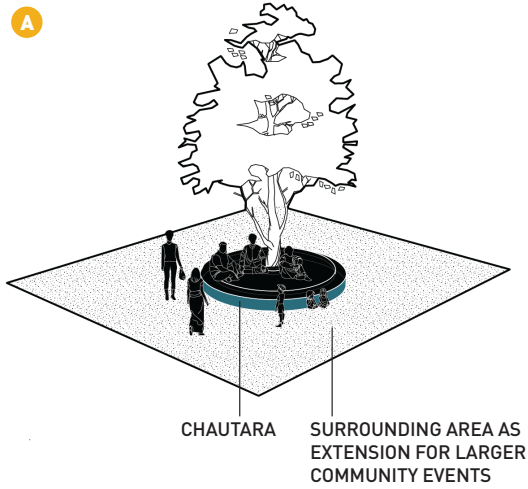
Similarly to Trishuli, the objective of the community centre is not to provide another formal education facility, but rather construct social infrastructure to demonstrate the benefits of education through vocational training and strengthening the community social network. The goal is to transform the site into a community hub, which has the potential to help alleviate some of the obstacles children are facing to receiving an education.

The site strategy is rooted in the principles of earthquake resistant construction. Addressing the steep inclination of the site, the plot was stepped into two terraces, with a two meter grade change between them. All of the buildings are positioned to maintain sufficient distance from the retaining walls (minimum 3m).

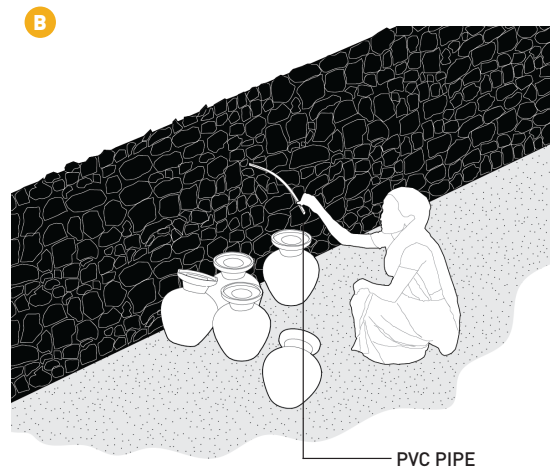
Program of the upper terrace is oriented towards informal education, containing workshop spaces for men and women, along with a small library and a computer lab. Lower terrace is geared towards community engagement, with a community room, a kitchen and a washroom block. A generous set of stairs runs along the retaining wall where two platforms meet; part of the stair has oversized steps used for casual daily gathering and informal meetings (which could also be used for scheduled community meetings or workshops), with two sections designated for circulation. A two level *chautara* is centred within the stairs, containing water storage below grade and potable water taps. The stairs and the *chautara* are designed to consolidate the level change between two open public spaces on each terrace, making a seamless transition between the two. The layout of the enclosed program produces a protected courtyard, which could be used for community events, as well as a market space and a safe place for children to play. The stairs can also become an extension of the market.

Broken apart into simple rectangular volumes, the masses are joined by light open-air trellis structures which contain a playground and shaded outdoor space that becomes an extension of interior program. Bamboo is surrounding the site on three sides to reduce storm water runoff and soil erosion, as well as prevent flooding on the site. In order to maintain visibility of the community hub from the road, bioswales are planted on the east side instead of bamboo, as *Bambusa Nutans* cultivation field typically reaches 10m in height. Retaining walls are placed at the edge of each terrace to further help control erosion. Drainage channels are dug around the masses to further divert the water from interior of the buildings.

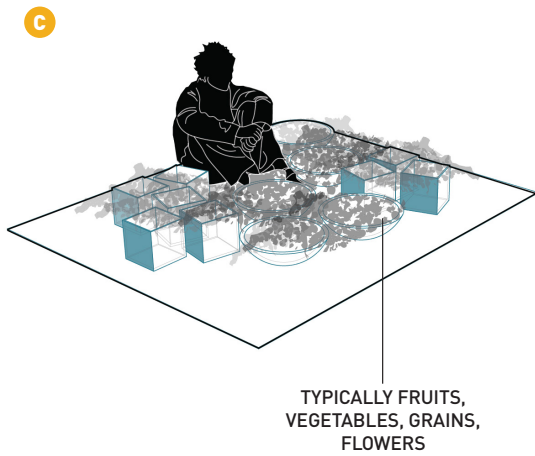
KEY VERNACULARS



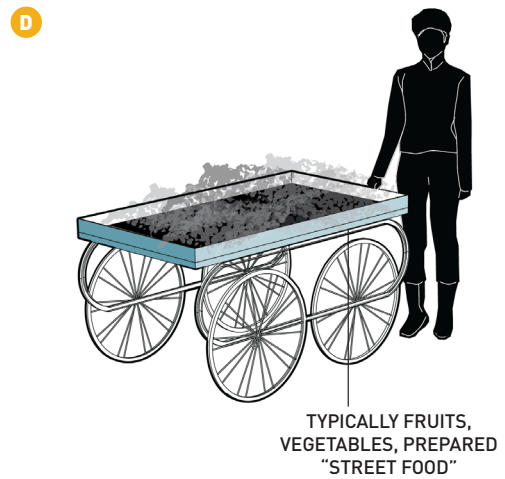
CHAUTARA



WATER COLLECTION



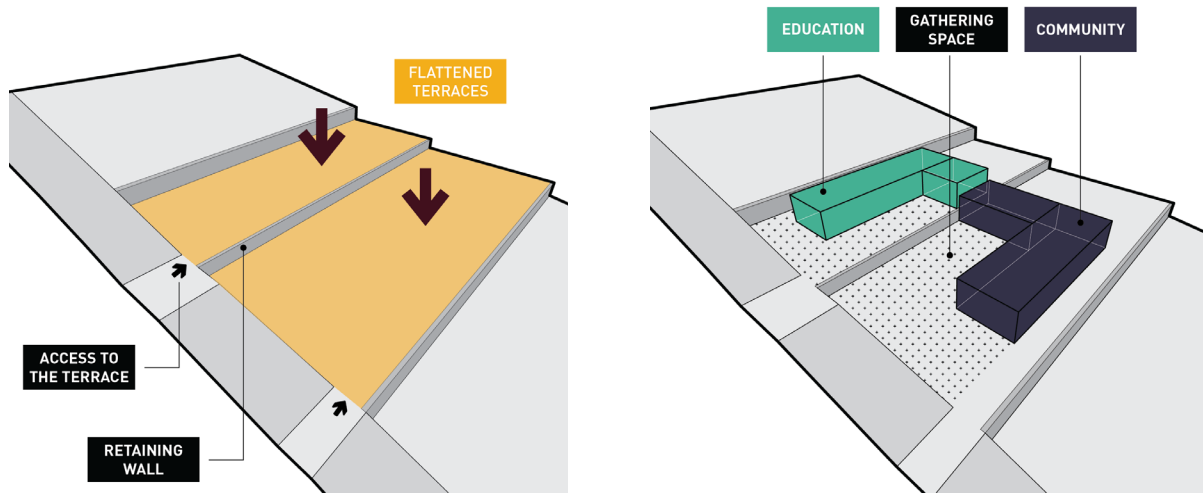
STREET VENDOR



STREET VENDOR WITH A CART

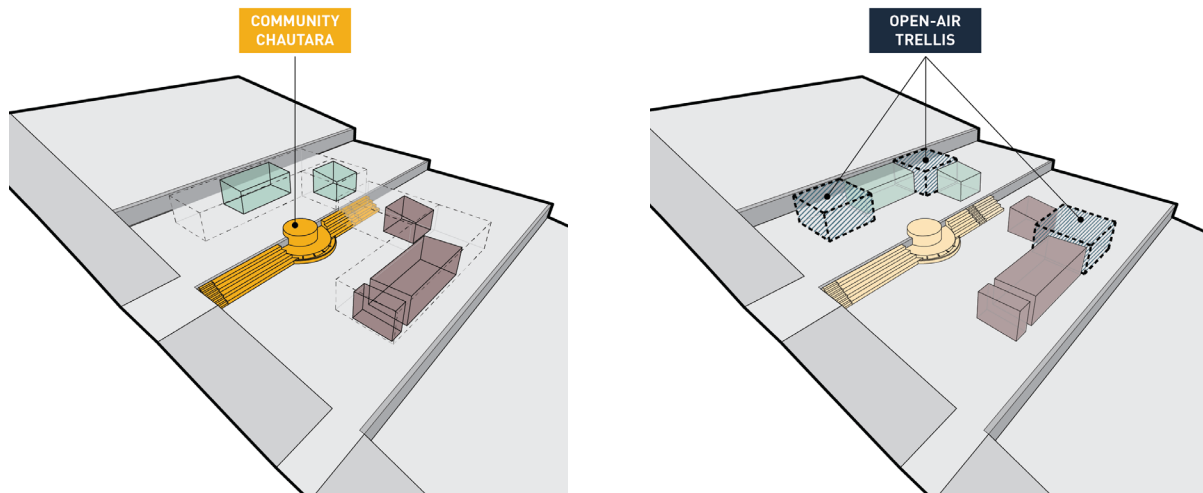
fig. 3.53 Key vernacular practices utilized in the proposal

SITE RESPONSE



A. Splitting the site into two terraces to accommodate two building wings; creating flat terrain is important in seismic zones for construction of sturdy foundations

B. Program split into two levels by themes: education and community-gear program



C. The break between two terraces is consolidated by a large community chautara

D. Open-air trellises connect enclosed program and allow it to extend outdoors if needed

fig. 3.54 Site response diagrams

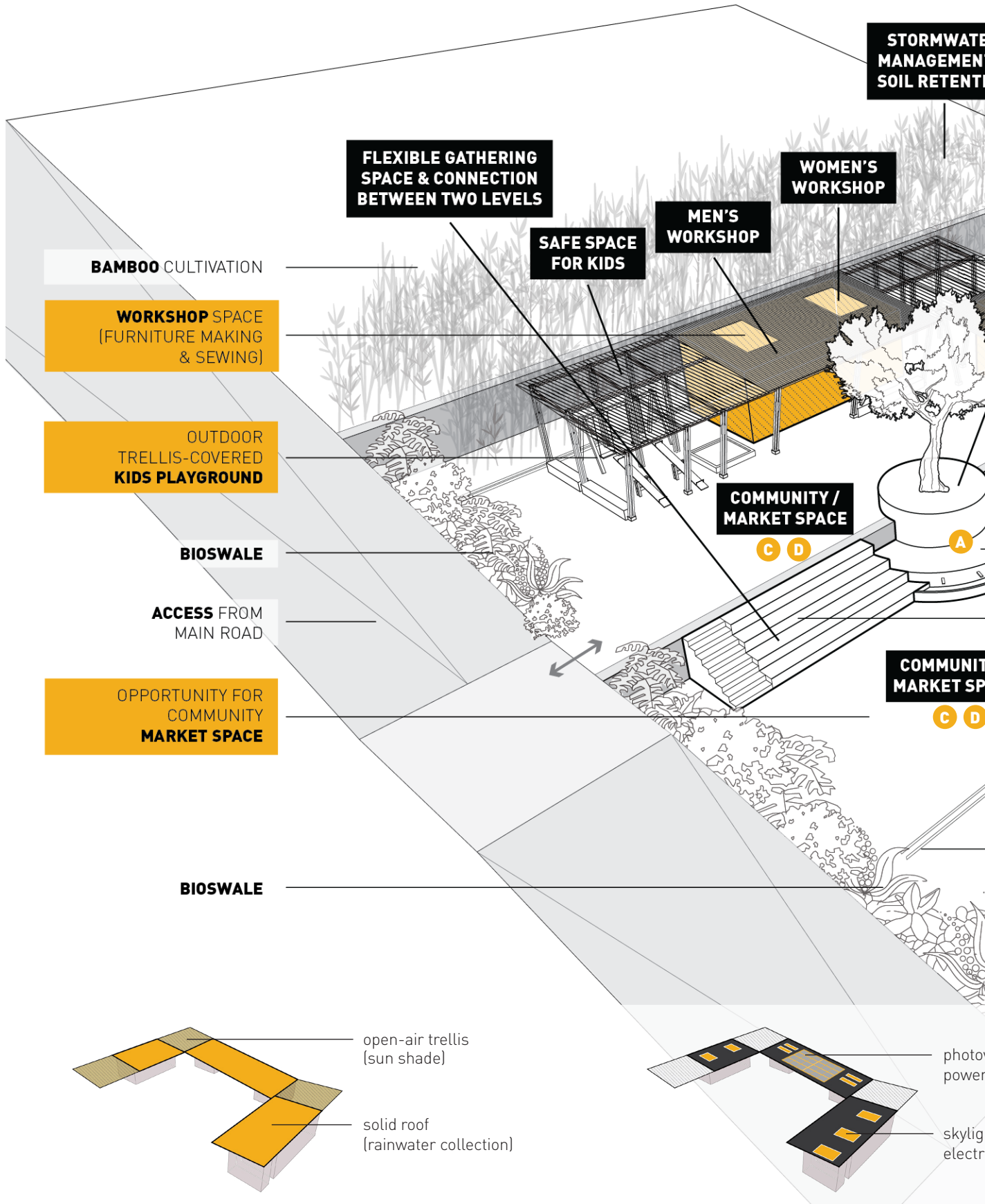


fig. 3.55 Axonometric diagram describing the proposed program

ER
T &
ON

**COMMUNITY
GATHERING**

**POTABLE
WATER TAPS**

SOLAR COLLECTION
(SUPPORTS UP TO 60m² OF
SOLAR PANELS)

OUTDOOR TRELLIS-COVERED SPACE

COMPUTER LAB & LIBRARY

COMMUNITY KITCHEN

OUTDOOR TRELLIS-COVERED SPACE

**CHAUTARA WITH INCORPORATED
POTABLE WATER TAPS**

OUTDOOR SEATING / GATHERING AREA

COMMUNITY SPACE

WASHROOMS & SHOWER BLOCK

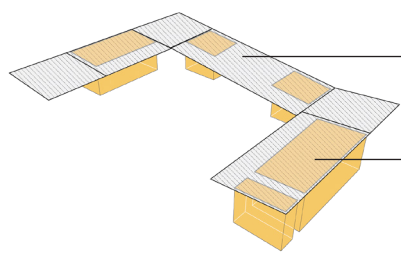
DRAINAGE CHANNEL

RETAINING WALL

Y /
ACE

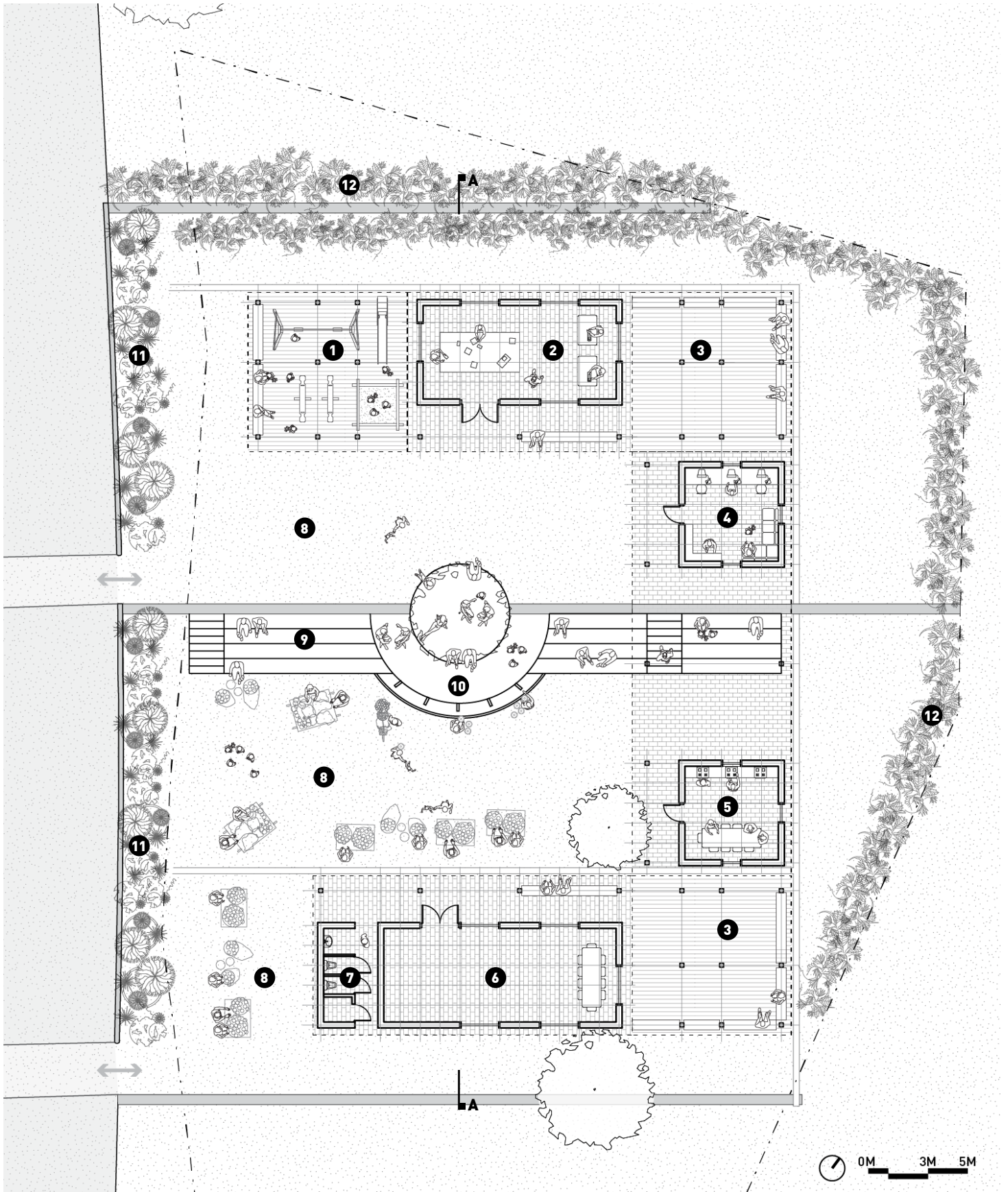
voltaic panels (available roof are for
ing the buildings on site)

hts (natural sunlight to reduce
icity demand)



— outdoor, multifunctional spaces for
community use during any time of
the day

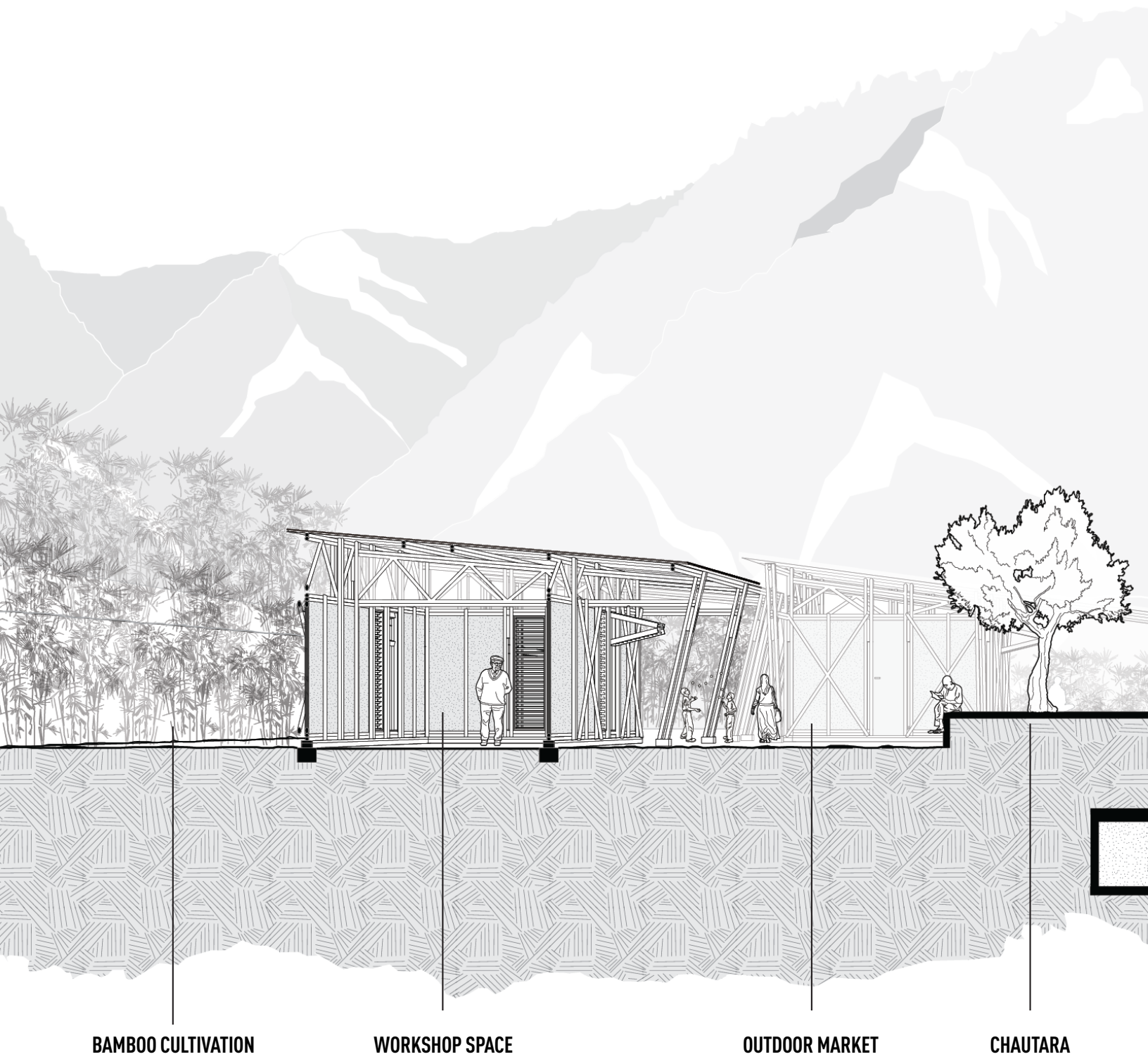
— enclosed, programmed spaces (could
have controlled access if required)



LEGEND

- 1** OUTDOOR TRELLIS-COVERED KIDS PLAYGROUND
- 2** WORKSHOP (FURNITURE MAKING & SEWING)
- 3** OUTDOOR TRELLIS-COVERED COMMUNITY SPACE
- 4** EDUCATIONAL SPACE (COMPUTER LAB & LIBRARY)
- 5** COMMUNITY KITCHEN
- 6** INDOOR COMMUNITY SPACE
- 7** BATHROOM BLOCK
- 8** OPPORTUNITY FOR OUTDOOR MARKET SPACE
- 9** OUTDOOR SEATING / GATHERING SPACE
- 10** CHAUTARA & POTABLE WATER TAPS
- 11** BIOSWALES
- 12** BAMBOO CULTIVATION

fig. 3.56 Floor plan



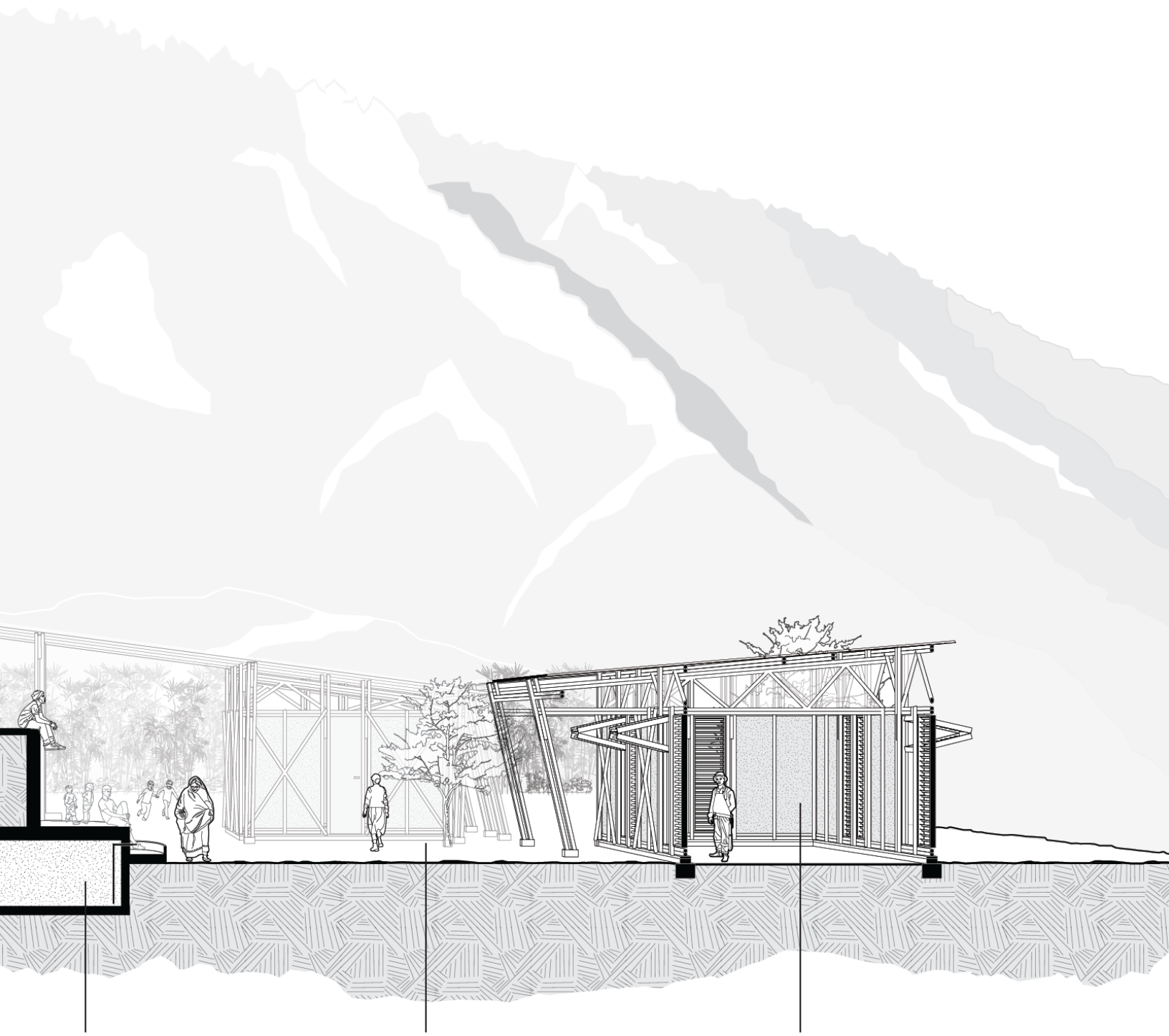
BAMBOO CULTIVATION

WORKSHOP SPACE

OUTDOOR MARKET

CHAUTARA

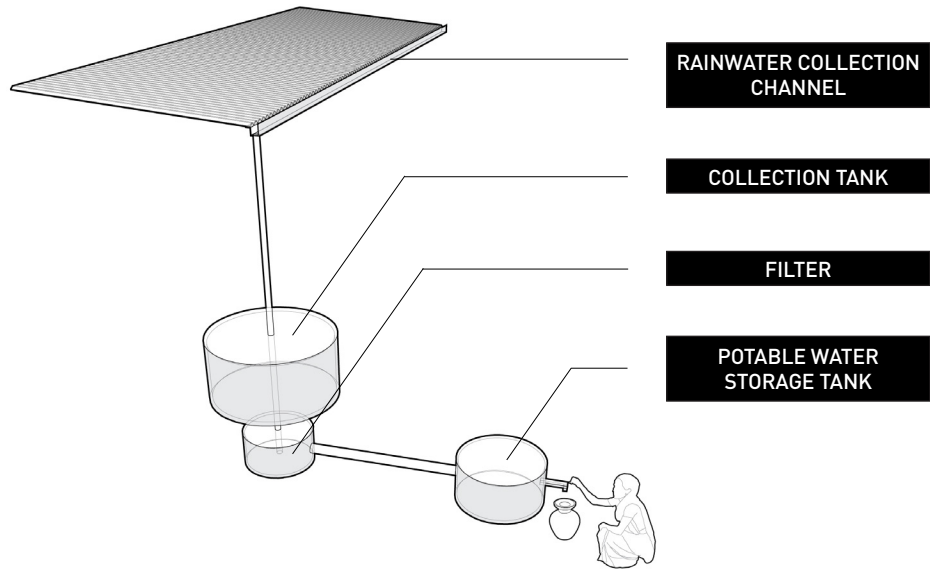
fig. 3.57 Cross section A



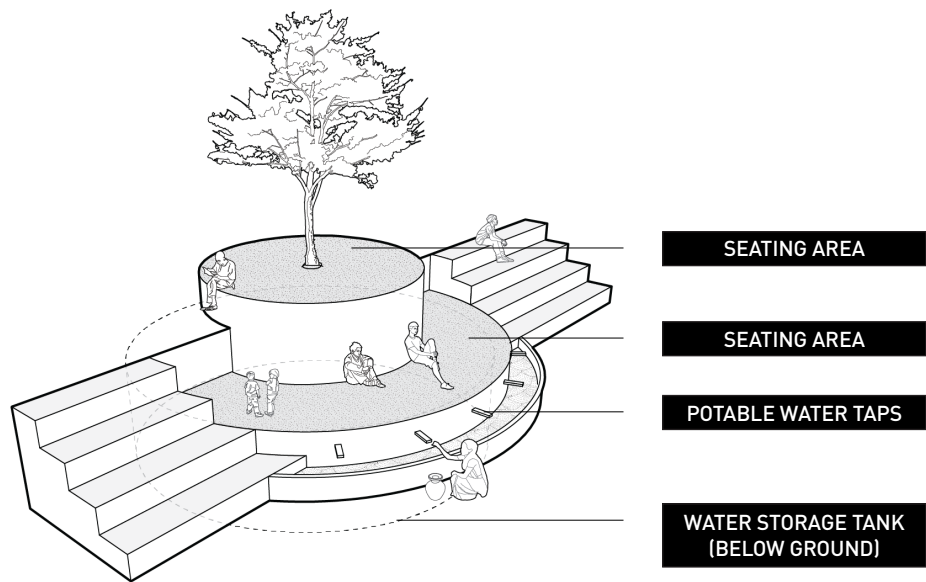
POTABLE WATER TANK

OUTDOOR MARKET

INDOOR COMMUNITY SPACE



RAINWATER COLLECTION SYSTEM



ACCESS TO POTABLE WATER

WATER MANAGEMENT

Nepal experiences strong monsoon rains every year between June and August, which often cause flooding and landslides. In order to manage stormwater runoff, bamboo cultivation field is proposed for the northern portion of the site. Bamboo has an extensive root system, which helps with water retention and prevents soil erosion. A series of bioswales are proposed for the west side, adjacent to the road. They have a similar benefit of helping with storm water retention, however the height of the plants is lower, so they won't obstruct the view of the community centre when approaching it from the road.

fig. 3.58 (opposite page)
Water management
strategies

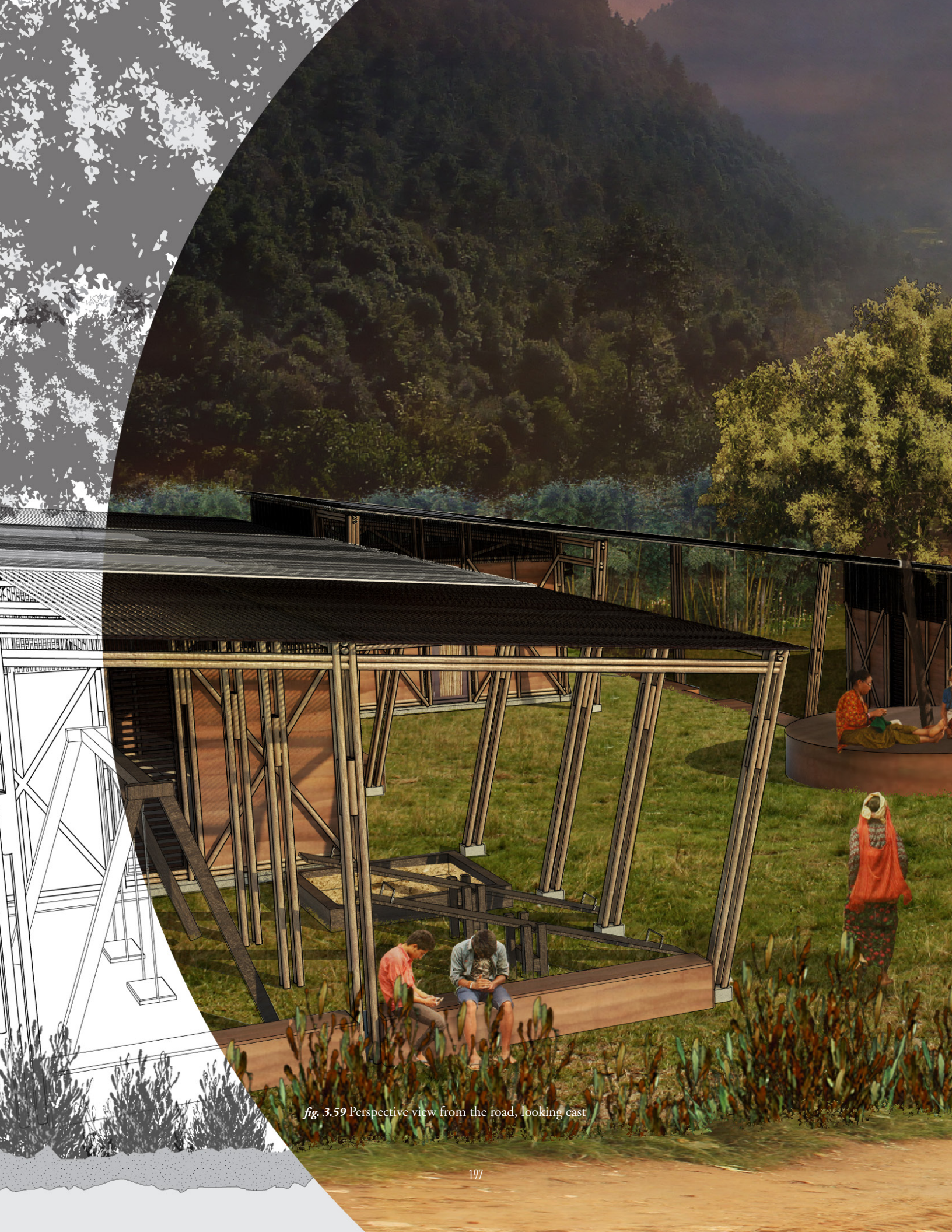


fig. 3.59 Perspective view from the road, looking east





fig. 3.60 Perspective view from the lower terrace



conclusion

Disaster recovery and community resilience building are incredibly complex, multidisciplinary fields of study, which cannot be reduced to strictly academic work. They revolve around a myriad of actors that all work on different levels of implementation- national and international governments, local authorities, community elders and most importantly, communities themselves. While authorities play an important role in policy making and implementation in areas like post-disaster emergency response and enforcement of the building code for seismically safe construction, communities remain the most important actor. Policies and legislations, just like a designed solution, can only go so far, as the end users ultimately determine whether the proposal will be successful or not.

My experience in Nepal has forced me to reconsider my role as an architect and my relationship to the people I try to assist. While I did get a chance to live in Nepal and be an active part of the community for several months, it is far from making me an expert in the community's needs and the nuances of their daily rituals and culture. However, coming from an academic and primarily technical education background, it helped me look at the problem of education and resilience building through a much more humanistic perspective. It revealed the depth of knowledge already present in the community and made me question the efficacy of the best-practice response model I have learnt. Consequently, my proposal doesn't present any new, foreign concepts to the community, but rather restructures and reorganizes the spatial and cultural practices that are already an active part of people's lives. As such, the proposal aims to encourage certain practices, to make them more accessible and perhaps emphasize their importance on both scales.

Just like with community resilience, better education and higher attendance rates is not something we can legislate, plan or design. This shift must come from within the community, as it welcomes change and directs the development in the way and the pace that suits them. As architects, designers and planners all we can do is try to search for a catalyst that may have the potential to speed up that process. All we can do is try to facilitate change, and hope that the community finds it beneficial. This thesis is just a search for that catalyst.

NOTES: CHAPTER 3.2

1. Anonymous NGO staff member, personal interview, June 9, 2017.

NOTES: CHAPTER 3.3

1. Andres Lepik, ed. and Ayça Beygo, ed., *Francis Kéré: Radically Simple* (Berlin: Hatje Cantz Verlag, 2016), 65.
2. “Baliyo Ghar,” News and Information, Fact Sheets, USAID. Last updated August 9, 2017. <https://www.usaid.gov/nepal/fact-sheets/baliyo-ghar>.
3. Anonymous NGO staff member, personal interview, June 9, 2017.
4. Ibid.

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2. Gernot Minke, *Building with Bamboo: Design and Technology of a Sustainable Architecture*, trans. by Joy K. Henderson (Basel: Birkhauser, 2016), 26.
3. *Ibid.*, 17.
4. Ministry of Urban Development, Government of Nepal, "Design Catalogue for Reconstruction of Earthquake Resistant Houses," Volume II, (Kathmandu, March 2017), 99. <http://www.dudbc.gov.np/uploads/default/files/a1efdb9058f9151775d9a2bae473ac0b.pdf>.

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